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ETHNOLOGY.—*Some mnemonic pictographs relating to the Iroquois condolence council.*[1,2] J. N. B. HEWITT, late ethnologist, Bureau of American Ethnology, and WILLIAM N. FENTON, Bureau of American Ethnology.

The use of mnemonic pictographs by the Iroquois and cognate tribes has long been recognized by various writers, but hitherto the subject has not received the attention that its cultural importance merits. A thorough study, if properly done, should reveal the technique employed by the natives in adapting means to ends, showing how the Iroquois sought to obtain their needs by the readiest available methods. That the latter would change with time and place is obvious to anyone who considers even momentarily the long history of the Iroquois and their relations with Europeans. One might hope that such pictographs were drawn on bark or buckskin; he should not be disappointed to find them on paper. What is remarkable is that certain ideas persist, and they are expressed in changing media. Beyond brief references to its casual use in the works of early writers, very little of a descriptive or interpretive nature exists in printed sources accessible to the student concerning the picture writing of the Iroquois Indians; its extent and the purposes it was made to serve are therefore but little known.

In the present brief study we do not aim to cover the entire subject of Iroquois pictography. Rather, this paper attempts to learn how the Iroquois adapted pictorial designs to form mnemonic records of what they deemed the distinctive features of two component rituals in the Condolence Council, which is a convocation of the confederated Iroquois tribes for the purpose of condoling the relatives of deceased federal chieftains and filling the ranks with chosen candidates; the visiting unscathed tribes of the League conduct the ceremony, restoring the minds of the mourning tribes. When the League was founded the lawgivers decreed that no seat around the great council fire should remain vacant. Accordingly, the Condolence Council comprises five rituals of condolence and installation, among which the Roll Call of the Founders and the Requickening Address were remembered by the symbols that are discussed below.

On one of his many field trips to the Six Nations of Grand River in Ontario, Canada, Mr. Hewitt in 1920[3] fortunately acquired a

[1] Published by permission of the Secretary, Smithsonian Institution. Received May 28, 1945.

[2] This is the second of Mr. Hewitt's manuscripts relating to the Condolence Council of the Iroquois League to appear posthumously. The first, the Requickening Address of the Iroquois Condolence Council (this JOURNAL 34 (3): 65–85, 1944), introduces the subject and carries explanatory notes on the Iroquois Confederacy and its social organization that need not be repeated. Mr. Hewitt's original manuscript entitled "Mnemonic Pictographs of the Iroquois," much too broad a title for its contents, was never completed for publication. The unfinished paper, with notes for the balance comprising MS. No. 3502 in the Bureau of American Ethnology Catalogue of Manuscripts, has been entirely rewritten by the junior author, who began the work with the help of Simeon Gibson in the autumn of 1943 and completed it in May 1945 at Ohsweken, Six Nations Reserve, with the assistance of Cayuga Chief Alex General and Howard Skye. The former field work derived support from a grant in aid from the American Council of Learned Societies, the latter from the Viking Fund and the Smithsonian Institution.

[3] Since this paper is written from the viewpoint of the junior author, the third person denominates the senior author, who died in 1937, and the first person is reserved for the present writer. Opinions of the senior author I have labeled "J.N.B.H.," interpretations of Simeon Gibson appear as "S Gibson," those of Howard Skye as "H. Skye," and comments of my own are initialed. "W.N.F."

Mr. Hewitt was in the field annually from 1916

small well-worn memorandum book of about a dozen pages, of a kind that country grocery stores commonly furnished gratis to customers as advertising. On previous occasions Mr. Hewitt had observed this notebook in the possession of old Chief Abram Charles. Chief Charles, then an emeritus chief of the Cayuga tribe, consulted it frequently while he was engaged in reciting either the Roll Call of the chiefs or the Requickening Address during sessions of the Condolence Council. The first of these rituals, the Roll Call of the Founders, is chanted; the other, the Requickening Address, is spoken, preferably in a rhythm which reminded Hewitt of blank verse. Chief Charles drew these arduous assignments because his contemporaries recognized that he knew the contents of these two rites and performed them accurately. Because the rites directly concern the dead and the living and because the origins of the League have acquired a holy aura, the Iroquois regard them as sacred, and performing the rituals publicly demands strict accuracy, since ancient custom enjoins that the celebrant must not err during the recitation; should he hesitate or stumble, another performer must be ready to continue; an error of this nature is construed as boding ill to all the people. Not only is it imperative to adhere strictly to the ordered sequence, but not to follow the established sequence confuses and confounds well-known political relationships that are basic to the functioning of the League and its institutions. It was thought that failure to follow the roll call of official titles, their grouping into classes, tribes, and moieties, and the political relationships of these groups as kin would vitiate the purposes of the chants.

Well aware that Abram Charles had great difficulty to read or write the simplest matter in English, Mr. Hewitt naturally was curious to know the contents of this small notebook to which Chief Charles constantly referred. So when a favoring opportunity presented itself Chief Charles was consulted about the matter. Hewitt was no little amazed to learn that this unpretentious notebook contained sets of mnemonic symbols or characters which had been devised ingeniously to indicate the number, the correct sequence of topics, and the roll call of federal titles comprising these two important chants.

There are eight pages of drawings. The envelope, in which Hewitt kept the pages mounted on larger sheets of paper (see footnote 3), contains pages from what appear to have been two notebooks. There are five pages on buff-lined paper measuring 8 by 14.5 cm and three pages on narrower coated stock, measuring 6.6 by 13.8 cm and bearing double pink lines at the top, of which one page (List No. 1) is dated "SEPT—1 1913." Apparently the latter drawings are of more recent date, to judge by the condition of the paper, but they are possibly copies of older drawings. The eight pages are occupied by 13 sets of drawings, which largely depict the upper portion of the human body. Clearly, some of the 13 sets are merely revisions duplicating some one of the other sets. Nevertheless, the entire group of drawings constitutes notes or memoranda for two of the main chants in the Condolence Council.

The first of the two chants or rituals involved here bears two titles since it has two aspects which the terms describe: Its first use is during the journey of the condolers from their home country toward the settlement of the tribe which mourns for its official dead; on the long journey representatives of the several condoling tribes intone the ritual as they slowly follow the path to the home of the stricken tribe, repeating the song day after day on the trail. This aspect of the ritual, therefore, in Onondaga was called *atahinón'ge*, "While journeying," or, in modern reservation parlance, "Going on the road." Its second aspect derives from repeating the ritual on arrival inside the meeting place, the longhouse of the mourning tribe, where the Condolence Council convenes. The term for the second aspect is *ne' ondathnonhsen'dedákhkwa'*, "that by which one passes through the house" (i.e., through the institution of the League).

to 1920, but he stayed in Washington throughout the fiscal year ended June 30, 1921. A letter envelope containing the pages from Chief Charles's notebook bears the legend: "Chief Abram Charles/ Books,/Ohsweken,/Ontario, Canada/1920."

Simeon Gibson rendered this term, "What a nation employs in calling at another nation's house." In this part of the ceremony the visiting singer leads the column of condoling chiefs into the longhouse of the mourning tribe, and then the singer alone paces to and fro reciting the Eulogy or Roll Call of the Founders of the League, which is the aspect of "Calling at the other tribe's house." The Roll Call is the roster of the 49(50) founders of the League,[4] their blood ties, and their political relationships; hence its English title. Hewitt adopted the descriptive caption "The Eulogy of the Founders of the League" as being more expressive of a ritual that lists the official names of its founders, with pertinent laudatory and historical comments interspersed after each of the names.

The second ritual involved in the drawings is the Requickening Address, which has been published in this JOURNAL. One set of pictographs, therefore, comprises memoranda for the Fourteen (or Fifteen) Matters constituting the condolences. Each one of the 14 symbolic human figures in this set (Fig. 6) represents one of the 15 topical sections, except one, of the great requiem address for elevating the minds of the stricken federal chiefs who are addressed as an individual. The Fourteen Matters respectively describe the 14 hurts or wounds inflicted on mortals by "that demonic Being that is faceless, Death—the Great Destroyer." Stricken in body and mind are the kindred who mourn. In the second place, with the 14 sections of the address the unscathed phratry of tribes performs vicariously acts of symbolic restoration to the faculties and bodies of the mourning phratry through the voice of their speaker. Since this part of the ceremony prescribes for the bodily and mental effects of death, it deals with affected organs and faculties. The Iroquois believe that bitter grief induced by death of kindred sets up in the mourner a blood deficiency that debilitates the organs and enfeebles the mind. So by the loss of a chief his kindred are depressed in mind and their vitality is lowered.

Before attempting to interpret the drawings of Chief Charles, one must understand some basic principles operative in the political structure of the League. One must also understand that the code of Condolence Law compels inflexible adherence to set forms in the two rites under discussion. Rather than repeat the exposition of these two sets of principles here, the reader is referred to the 1944 edition of Mr. Hewitt's paper on "The Requickening Address of the Iroquois Condolence Council," to which are appended notes on the Iroquois Confederacy and its social organization. For the benefit of those who do not have access to that paper, we may state briefly that the principles of blood kindred, duality (with mutual service between reciprocating units of society), relative age, and sex, as they operated in society as it was lived by the village band, were projected beyond the local group to the level of the tribe, and from the tribe to the confederacy. Thus what individuals do in the band, whole tribes perform in the confederacy. Tribes apply kinship terms to other tribes: they are related as mothers or little mothers (i.e., mother's sisters), daughters and sons, older sisters and younger sisters, elder brothers and younger brothers, and mother's brothers (uncles), father and little father (i.e., father's brother), father's sister, in some tribes, and mother or little mother, in others.[5]

Relations of consanguinity and affinity which the founders of the League ascribed to chiefs of the several tribes must be constantly kept in mind when reciting the chants. In performing the Eulogy or Roll Call the celebrant must remember three things: the song, the list of names, and the relationships between the names that fill out the verses of the chant. Therefore, the

[4] Hewitt contended with the Cayugas that there were but 13 titles on the Onondaga list, the last person, *Skana'wati*, having two names correlative with peace and war functions. Instead of 14 Onondaga chiefships, since one man occupied two statuses and performed two roles, this left but 49 chiefs on the federal roster, not 50 as the Onondagas contend and as there were in later times.

[5] The terms for aunt and uncle are found only among the Seneca and Tuscarora and do not occur in Mohawk, Oneida, Cayuga, and Onondaga dialects; the reason for this is not known. —J.N.B.H. It is my impression that these findings do not accord with Goldenweiser's data for the kinship of the Six Nations.—W.N.F.

chanter must observe carefully the correct sequence of terms in the ritual, Evidently the task was not an easy one for an unassisted memory, and gradually mnemonic aids like the pictographs which are the subject of this paper came into use.

Chief Charles's drawings are of the same order as the symbols in wampum belts, although the latter are perforce geometric; the practice of using drawings is like holding a series of twigs or marked counters or sticking tallies upright in the ground; the drawings serve a similar purpose to tally sticks notched to indicate a period of days or points to be enumerated in speaking; and we are reminded of the series of wampum strings of graduated arrangement and distinct color patterns that accompany burdens of the Requickening Address. Moreover, the old chiefs carried canes. Sometimes the chiefs carved memoranda on canes as on other sticks to remind them of stations in a long address involving a dozen or more points. Again, the chiefs commissioned craftsmen to make canes and adorn the surfaces with symbols appropriate to reminding celebrants of the significant stations in a ritual. Thus, among the extant examples of such record canes, the Cayugas formerly had a Roll Call Cane, now in the Cranbrook Institute of Science, that the appointed Eulogy singer carried in the same ceremony as these drawings to denominate the 50 titles of the chiefs who founded the League.[6]

With the sole exception of the one page of illustrative drawings as symbols for the Fourteen Matters of Requickening (Fig. 6), the remaining notebook pages of pictographs refer to the Roll Call of chiefs. Four sets of these (Figs. 1–3 and one set not illustrated), however, stand for the Mohawk and Oneida rosters of chiefs. The Onondaga roster appears clearly once on the same page as the Seneca roster (Fig. 4); the latter is not represented again in recognizable form; but the Onondaga characters appear again on List No. 2 (Fig. 5),[7] but out of order. The Cayuga chiefs are not illustrated except by a series of dots (Fig. 5), to which we return in a moment; Abram Charles, being a Cayuga chief, could remember the roster of his own tribal council.

In some respects the grouping of chiefs and their relationships to one another is more fundamental than their titles. At least the Iroquois ritualists have isolated the patterns of spatial arrangement which they illustrate in a number of ways. One page of Chief Charles's notebook contains a series of dots, ... (Fig. 5), spaced in the sequence 2-3-3-2, which is the grouping of Cayuga chiefs in council. Another page carries out similar sequences for all of Five Nations.

On the latter sheet, Mohawk and Oneida appear at the right, one over the other in sequences of threes. On the left at the top are the Cayuga chiefs. Beneath them on a slant are the Seneca, four groups of two. The Onondaga list runs across the bottom of the page to the left of the Oneida, reading from right to left.

(Cayuga) (Mohawk)
../.../.../.. .../.../...

(Seneca)
../../../..

(Onondaga) (Oneida)
../.../../../..... .../.../...

Knowing in part the sequence of chiefs from the Roll Call, and using these data, we can reconstruct the grouping of chiefs and their relationships, which, if Chief Charles's notes are read from right to left, work out as follows:

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[6] W. N. FENTON, *A Cayuga condolence cane with pictographs denominating the founders of the Iroquois League* (MS.).

[7] List numbers derive from the original paper. To avoid confusion a correlation of List numbers and Figure numbers follows:

List No. 1. Mohawk and Oneida titles (Fig. 1). Older buff paper.

List No. 1. Onondaga and Seneca titles (Fig. 4). Newer coated stock, and dated "SEPT—1, 1913."

List No. 2. Onondaga titles (5–14; 1–6), and Cayuga groupings (Fig. 5). Older buff paper.

List No. 2. Mohawk and Oneida titles, with Seneca titles poorly drawn at bottom (not illustrated). Newer coated stock.

List No. 3. Mohawk and Oneida titles (Fig. 3). Newer coated stock.

List No. 4. Mohawk and Oneida titles (Fig. 2). Older buff paper.

Groupings of chiefs in five tribes (not illustrated). Older buff paper.

Mohawk: 3-3-3
Oneida: 3-3-3
Cayuga: 2-3-3-2
Seneca: 2-2-2-2
Onondaga: 6-1-2-3-2*

* (Hewitt gives 1, making 13.)

We find, therefore, 19 groups (classes) or committees of chiefs in the Conferederate Council. The arrangement of dots to represent these groups in Chief Charles's notebook, moreover, follows a design for laying down kernels of corn that he and other Iroquois ritualists employed when instructing Eulogy singers in the Roll Call of chiefs and in teaching their relationships. Precisely the same pattern is found in the grouping of pegs on the Cayuga Condolence Cane in Cranbrook Institute.

Evidently when the ritual of Journeying on the path to visit the longhouse of the mourning chiefs took final form, the Roll Call contained 50 titles, represented by 49 chiefs, according to Hewitt and the Cayugas. Of these 50 titles, 9 belonged to the Mohawk, 8 to the Seneca, 14 to the Onondaga (represented by 13 chiefs), tribes on the Male or Father side (the Three Brothers side); and 9 to the Oneida and 10 to the Cayuga, tribes of the Female or Mother side (the Four Brothers side, later, including Tuscarora, Tutelo, and Delaware) of the council fire of the League. This means that one tribal phratry or moiety of the League council, that of the Father side (also called Elder Brothers), claimed 31 titles, represented by 30 federal chiefs; and only 19 titles belonged to the Mother side (also called Offspring, or Younger Brothers).

Besides these two larger tribal moieties the great body of chiefs comprised 19 smaller, intratribal groupings (above), expressing similar blood and political relationships within the several tribes. At once these lesser groupings furnished the timber and the plan with which the founders erected the confederate structure. Within these lesser groupings no unit is larger than three; oftener the group includes two; one large committee of six comprises three units of two. Thus the tripartite grouping and the basic pattern of duality intersect in the social and political organization of the League of the Iroquois tribes as the warp and the woof of the Great White Mat of the Law, which spreads out beneath their political structure. Two men sit across the symbolic council fire from each other as cousins, or they sit together on the same side of the fire as brothers opposite a third who is their cousin. From the fireside council of the Mohawk Turtle clan, to the tribal council of the Mohawk Nation, to the confederate council of the League, the same patterns of tripartite grouping and reciprocity between moieties prevailed.

By way of illustration Hewitt summarized the social and political organization of the Mohawk and Oneida tribes. Each tribe had three clans: Turtle, Wolf, and Bear. With the Oneida, the order was Wolf, Turtle, and Bear. With the Mohawk Turtle and Wolf are political brothers, forming a moiety, one side of the tribal duality, and Bear sits alone. But among the Oneida, Wolf and Turtle are political brothers, forming one moiety, and Bear the other.

The Mohawk Turtle clan chiefs and the Oneida Wolf clan chiefs, in the councils of their respective tribes, functioned as chairman or presiding officer, and as such they took no part in deliberations of the council beyond hearing and determining whether the proceedings of the session were legal and conformed to established custom; if so they confirmed the decision; otherwise they referred the matter back to the council for further deliberation and action, perhaps with pertinent corrective comment. Tribal councils, organized on this pattern and functioning as described, resemble, Hewitt thought, an American court composed of judges and jury.

In confederating to form the federal council the founders of the League adopted this tripartite form of the dual tribal council, but they rearranged constructively the internal political structure of the Onondaga, whose duty it was to preside at the sessions of the federal council. From among the 14 Onondaga chief statuses the founders of the League appointed an executive committee of five who were called the Firekeepers. It was the function of the Firekeepers to decide what disposition should be made of the resolutions and de-

cisions arising out of the deliberations of the 36 chiefs representing the four other tribes of the League, and accordingly to advise the presiding chief, *Dehadoddho*, leading Onondaga chief, what action he should take. In possessing the Firekeepers, theoretically the Onondagas as presiding tribe of the League council in no way controlled the deliberations of the body, no more than did the presiding clans in the tribal councils of the Mohawk and Oneida, on which the confederate structure was modeled. The report of the committee called Firekeepers constituted a judgment, and when the presiding chief *Dehadoddho* pronounced a judgment the case was closed.

The following diagrams illustrate spatial arrangement of clans and the functions of the chiefs in relation to the symbolic council fire. It will be seen at a glance that the same pattern obtains at the level of the tribe and of the League. We give the number of chiefs for each grouping in the Mohawk and Oneida tribal councils. At the left is the Male of Father Side of the council fire, and the right is the Female of Mother Side.

MOHAWK TRIBAL COUNCIL

Turtle Clan
Three Chiefs
Judge

Wolf Clan Three Chiefs *Legislative*	Tribal Council Fire	Bear Clan Three Chiefs *Legislative*

These are Brothers to Turtles above.

These are Cousins to Turtles and Wolves across the fire.

ONEIDA TRIBAL COUNCIL

Wolf Clan
Three Chiefs
Judge

Turtle Clan Three Chiefs *Legislative*	Tribal Council Fire	Bear Clan Three Chiefs *Legislative*

These are Brothers to Wolves.

These are Cousins to Wolves and Turtles across the fire.

FEDERAL COUNCIL OF THE IROQUOIS LEAGUE

The Onondaga Tribe
Fourteen Chiefships, held by 13 chiefs
Firekeepers
Judge

The Mohawk Tribe Nine Chiefs *Legislative* The Seneca Tribe Eight Chiefs Doorkeepers *Legislative*	League Council Fire	The Oneida Tribe Nine Chiefs *Legislative* The Cayuga Tribe Ten Chiefs *Legislative*

The Mohawk and Seneca tribes are Brothers to the Onondaga tribe. These three call the Oneida and Cayuga tribes "Offspring" or "Nephews."

The Oneida and Cayuga tribes are Cousins to the three tribes across the fire. They are "Offspring," being on the Mother Side of the council fire. Including adopted tribes in later times they became the "Four Brothers Side." They call the three other tribes of the Three Brothers Side, "Fathers' clansmen" or "Uncles."

In the old council of life chiefs on the Grand River, which held court until 1924 at Ohsweken on Six Nations Reserve, the above diagram would have been reversed, with Mohawk and Seneca sitting east of the "fire," the Onondaga as Firekeepers in the center, His Majesty's agent to the north, and the Oneida and Cayuga with appended tribes sitting west of the fire:

ONEIDA H.M.S. MOHAWK

X

ONONDAGA

CAYUGA SENECA
Tuscarora
Delaware and Tutelo

Under the latter arrangement, which is the same as the first only turned about for true orientation, Onondaga-Mohawk-Seneca constituted the Three Brothers Side,

and the Four Brothers Side comprised Onondaga-Cayuga-Tuscarora-Delaware (and Tutelo). The latter three, being dependent tribes, adopted by the Cayuga and the Oneida, had no voice in the federal council. The remnants of the Nanticoke were included among the Delaware.

Now let us take up the lists of chiefs which Chief Charles illustrated with his notebook drawings.

THE MOHAWK PICTOGRAPHS

Four sets of drawings may be ascribed to this tribe: List No. 1 (Fig. 1), List No. 2 (not shown), List No. 3 (Fig. 3), and List No. 4 Fig. 2). Hewitt is responsible for numbering the lists (see footnote 7).—W.N.F.

1. *Tekarihhókenh*, "It separates or divides the matter."

The first name on the Roll Call, and the first name on the Mohawk tribal roster, is represented on List No. 1 by a forked stick; on Lists Nos. 2 and 3 by a man's head with a forked tongue protruding from the mouth, as if to illustrate the interpretation now current at Six Nations, "Of two opinions." Apparently, the symbol for this name is lacking on List No. 4.

2. *Hayenhhwénhtha''*, "He sifts with a bark sieve."—J.N.B.H., or "Early riser" (S. Gibson).[8]

On the Mohawk List No. 1, this chief is represented by three dots vertically arranged (Fig. 1), on List No. 3 by a man's head and torso having five dots on the body to represent "the sieve" (J.N.B.H.) (Fig. 3); List No. 2 has a bisected oval figure, probably an error, taking the place of the third name; and the second Mohawk title appears first on List No. 3 as an irregular figure with dots "to depict the sieve" (Fig. 2).

3. *Sha'tekarihhwáte'*, "Matters of equal height, words of equal length."

Three vertical lines topped by a horizontal line depict this chief on Mohawk List No. 1 (Fig. 1), showing that the three items are of equal import. List No. 2 has a similar symbol of but two vertical lines with a horizontal line across the top. A man's head topped by a heavy horizontal line represents this chief on List No. 3 (Fig. 3). List No. 4 is less clear; the drupe-shaped symbol is capped by a heavy horizontal line, defining a limit to its height (Fig. 2).

A hiatus occurs here in all the lists, indicating that these three, the Turtle clan chiefs, stand together apart from the next three.

4. *Sharenhhówane'*, "He the great tree trunk."

A tall trunk of a tree having three long roots stands for this name on List No. 1 (Fig. 1), and

FIG. 1.—List No. 1: Mohawk and Oneida titles.

in the same manner on the remaining lists, but with four roots.

5. *Teyonhhéhkonh*, "It lives by two life-givers," or "Double Life."

The name of this title is represented by two V-shaped characterters on List No. 1 (Fig. 1), the one set above the other, enclosing two dots. The remaining lists show the head and torso of a man having two heart-shaped devices on the breast. "Double life" was the idea that Chief Charles evidently intended.

6. *Ohenhhe'góonah* (Oa.) or *Orenhre'kówah* (M.), "Great White Eagle," or, possibly, "Great Canada Goose."

On all four lists of pictographs, this chief is depicted by the figure of a bird, facing to the left. On these lists the character of the bird resembles a fowl; on the Cayuga Condolence Cane at Cranbrook Institute, however, its aspect is that of a dove or hawk, facing the other way.

Here a hiatus of vertical dots on all lists signifies completing the roll of the Wolf Clan chiefs, who are cousins to the next three.

[8] Hewitt did not comment on this new interpretation, which differs from that in his article *Hiawatha* (Handbook of American Indians, 1912 ed.). From Onondaga Chief John Buck of Six Nations Reserve, Mr. Hewitt had in 1931, "He who sifts with a woven bark sieve" in the following dialectical forms: Hayęnhhwáth'ha' (Oa.), Hayénwathha' (Hayíwathha') (S.), Hayenh'wathha' (third syllable whispered) (C.), Rayénhwathha' (M.), La—(Oe.).

FIG. 2.—List No. 4: Mohawk and Oneida titles.

7. *Tehenna'kariine'*, "His two horns are moving along," or "Dragging Antlers."

The antlers figure prominently in the symbols of all four lists: on List No. 1 (Fig. 1) a human head with antlers over its forehead; on List No. 2, merely a small round object bearing deer's antlers; on List No. 4, a poorly drawn human head with deer antlers. Chief Charles intended apparently to delineate a chief carrying his two antlers, the horns of office.

8. *Hahstawen'serónthа'*, "He attaches rattles to it."

This title is represented on List No. 1 by what appears to be an outline of a turtle shell rattle, held upright; the same is crudely drawn on List No. 2; on List No. 3, an outline of a rattle bears two dots on the shell; and on List No. 4 the attempt to draw such a rattle is crude, to say the least. The rattle is the key to this name.

9. *Sosgohharóowane'*, "He the great branch." (Hewitt's MS. gives "He the great quantity of drift-wood" or, just as meaningful, "He has a large cadaver," but these interpretations make no sense.—W.N.F.)

The outline of a tree branch appears clearly on all the lists. Surely this is what Chief Charles had in mind.

This is the number of Mohawk chiefs, marked on all lists by a series of vertical dots.

THE ONEIDA PICTOGRAPHS

The following chiefs are the "Offspring" of the first. (The Roll Call continues, but we enumerate the chiefs of each succeeding tribe separately, e.g., 10/1, 19/1, 33/1, and 43/1.)

10/1. *Ho'datchéhde'*, "He bears a quiver (by a forehead strap)" or, with a slight change in pronunciation, "He bears a fawn (buckskin pouch) by a burden strap—J.N.B.H.[9] "He carries a quiver on his shoulder," or, simply, "Carries a quiver" is the usual meaning—W.N.F.

In all the drawings the quiver idea is prominent. What is possibly intended for a quiver with attachment for carrying appears on List No. 1 (Fig. 1). A human head and bust bearing a quiver on the shoulder occurs on List No. 2 (not illustrated); the same appears on Lists Nos. 3 (Fig. 3) and 4 (Fig. 2).

11/2. *Kanonhkwen'yóoton'*, "One has set upright several ears of corn," "Standing ears of corn," or "Standing corncobs."

The second Oneida title is depicted on the first three lists by a straight line inclined at its top to the left; on List No. 4 is a drawing of an ear of corn, also inclined to the left at the top.

12/3. *Teyohhá'kwente'*, "It has a gullet" or "Difficult swallower." "Between the openings (of the forest)"—S. Gibson. In the Deganawídah legend, this chief passes without leaving an opening in the forest.

On List No. 1 this title is depicted simply by a crude drawing representing the profile of a human face; a pronounced double chin appears on a head and torso of List No. 2; several dots

[9] Quiver (*gahéskaa'*) *gᵊ'dá'tčhe'*, buckskin pouch); but a new born deer is owiiyᵊ', and deer (skenóndon'); "he carries the body" would be *hoya'dagéhde'*. The quiver that this old Oneida chief carried was made evidently of buck or fawn skin—S. Gibson.

direct attention to the neck, probably to denote its opening, on the drawing of a head and body in List No. 3; and the double chin appears again on List No. 4.

A hiatus occurs here in all the lists. This is the number of Wolf Clan chiefs.

13/4. *Shonónhsese'*, "His lodge is very long."

A drawing of a house with or without a doorway appears on all four sets of drawings: a house (Fig. 1), a tall gable marked with a line for the doorway (List 2), two lines indicating doorway in gable (Fig. 3), and merely a house gable in List No. 4 (Fig. 2).

14/5. *Tehone'okén'ah* or *Daona'rokén'ah*, "He the small forked root."

In all four sets of drawings this chief is depicted by a drawing of a fork. In Onondaga and Cayuga this name changes to "Two words (voices) meet," (dwennaigén'a (Oa.), dodwennaigén'ah(C.).—S. Gibson.

15/6. *Hatya'tonnénhtha'*, "He swallows an object (body)" or "He drugs his body." The name is probably corrupted.

In all the sets of drawings this chief is depicted as swallowing an object: a small cross, an unrecognizable object protruding from the mouth of the figure (List No. 2), a 3-pronged object protruding from the mouth (Fig. 3), and List No. 4 (Fig. 2) shows the full figure of a man, and protruding from his mouth is an object which ends in a small loop.

This ends the second group of Oneida chiefs, the chiefs of the Turtle clan, and a line or series of dots indicates the hiatus.

16/7. *Tewatahonhténnyonk*, "Pairs of ears hanging," or "Pendulous vibrating ears (as if slit)" *Dewatahenhdénnyonk* (Oa.).—S. Gibson.

The ear is the prominent feature in all four sets of drawings. An enormous ear appears on List No. 1; the remaining sets show a human head and neck, with a very large ear. Simeon Gibson, citing the Deganawídah Legend of the founding of the League, referred to the first appearance of this chief as having enormous ears that were probably slit for insertion of feathers, leaves, and other decorations, which, once removed, left the helix and lope to hang vibrating. "Moving his ears" is the current interpretation.

17/8. *Kaniya'taasháayen'*, or *Ronya'dashá-yonk* (M.), *Ganiya'dashóayen'* (Oa.), "A pouch (or bag) lying (resting)," or possibly a "fawn skin" (J.N.B.H.). In Onondaga, *ga'dashā'yen'* is a "lying pouch." But Simeon Gibson and a Mohawk matron independently gave "Slow swallower" for their respective dialectical variants of this name.

The pouch or bag theory is supported by Chief Charles's drawings. List No. 1 (Fig. 1) depicts the name by a lozenge-shaped object that Hewitt interpreted as a hanging pouch or skin; on List No. 2 the object resembles a quiver and is banded across the middle; List No. 3 (Fig. 3) has a similar design; and the character is a hanging pouch on List No. 4 (Fig. 2).

18/9. *Honwatsatónhhonh*, "One has covered him with fog." *Honwahtcadónhwi* (Oa.), "He is covered with mist."—S. Gibson.

The head of a man shrouded in mist appears on all four lists. On List No. 4 it is a pot-bellied man.

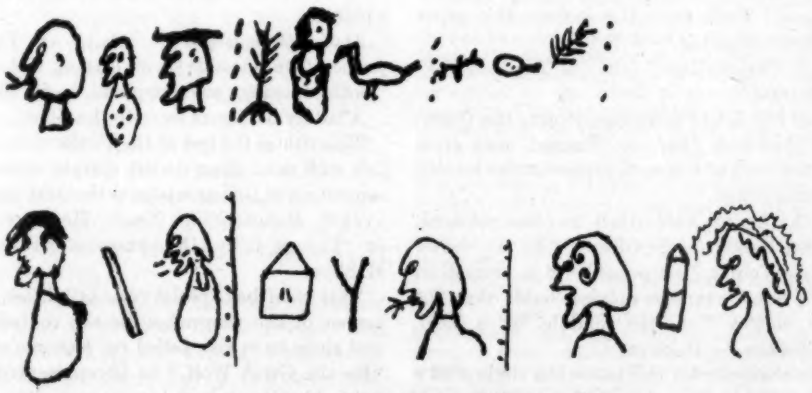

FIG. 3.—List No. 3: Mohawk and Oneida titles.

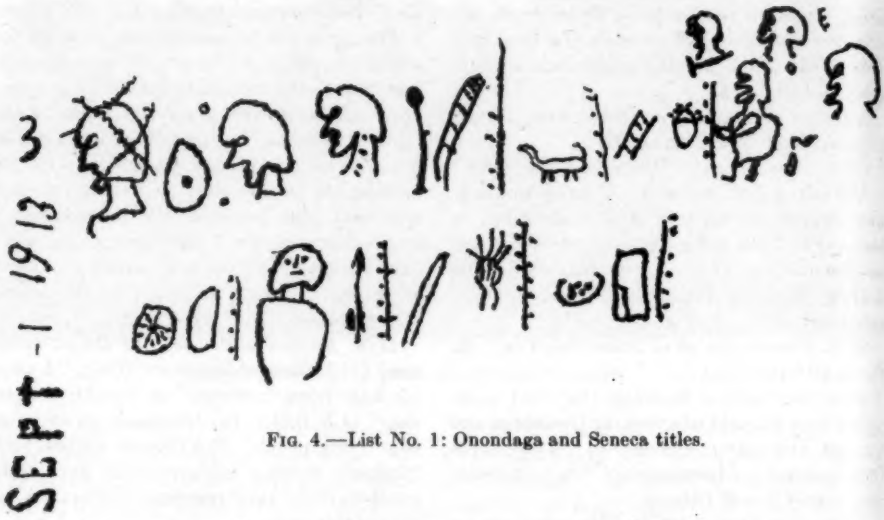

FIG. 4.—List No. 1: Onondaga and Seneca titles.

This group were the Bear clan chiefs. This was the roll of Oneida chiefs.

[For some reason Hewitt omitted an analysis of the Onondaga and Cayuga lists of drawings, and his notes for this manuscript (B.A.E. No. 3502) do not contain the rosters of chiefs' names for these two nations. However, Hewitt obtained from Chief Charles in 1917 a complete text in Onondaga for the Eulogy or Roll Call of the Founders of the League, together with independent lists of chiefs whose clan eponyms are differentiated (B.A.E. MS. No. 1281a, 54 pp. 6½×9½ inches, 15 pp., 8×10 inches). Also, we find a typed, revised list (No. 3558, 3 pp. 8×10 inches—Charles, 1917) of "Federal Chiefships and their kinship eponyms." From the latter sources, this paper has been completed.—W.N.F.]

19/1. *Dehadodáhho'* (Oa.) or *Thadodáahho'*, "Ensnarled."

Only one set of drawings depicts the Onondaga chiefships (Fig. 4). Ragged lines cross over the head of a man to represent the leading Onondaga chief.

20/2. *One'sāh'henh* (Oa.) or *Gane'sāh'henh*, "A tied bundle."—S. Gibson; "In the center of a coil, circle," or possibly of a "stretched hide"; but Onondaga opinion holds that the name means "on the middle of a field, *gane'sāā'hen*."—H. Skye.

The character for this name is a circle with a dot at the center. Possibly it represents a bundle. On the Condolence Cane of the Cayugas the symbol suggested to Howard Skye a hide stretched on a hoop.

21/3. *Dehatgáhdons* (Oa.) or *Thaatgáhdons*. "He looks both ways (or around); On watch."

A drawing of a head in which the eye is prominent stands for this chief.

22/4. *Honya'dadji'wak* (Oa.) or *Hoya'dadjii'wak*, "His throat is sour (or black)"; or "His sour body."—H. Skye.

Again we find the drawing of a chief's head; four dots direct attention to his throat which apparently is inflamed or soured by gall.

23/5. *Awe'génhhyat* (Oa.), "On the surface of the water."

A line with a knob on top perhaps represents a plant.

24/6. *Dehaya'tgwáae'* (Oa.), or *Thayadgwáae'*, "On one side of its leaning body" (?); "Both his wings are outspread."—H. Skye.

A ladderlike figure leans to the right.

This title is the last of the Firekeepers, and a line with dots along its left margin indicates a separation of this group from the next name.

25/7. *Hononwiéhdih* (Oa.), "He conceals it" or "Covers it"; "He causes it to sink."—H. Skye.

This chief has special responsibilities. He is keeper of the wampums for the confederacy, and since he is also called *ne' hogwaho'góonah*, "He the Great Wolf," he is represented by a miserable drawing of his eponym. This chief

stands alone; a line with a margin of dots separates him from the remaining Onondaga chiefs.

26/8. *Gowennen'shéndonk* (Oa.) or *Gawanne'shéndonh*, "Her voice is hanging," or "Hanging strings."—S. Gibson.

Whatever this title means, and it is impossible to know what about one-quarter of the titles meant four centuries ago, it is depicted by a stepped character that leans to the right, composed of two leaning lines enclosing four oblique lines.

27/9. *Hahhtíhhon'* (Oa.), "He spills it" or "He tips it."

This name is also obscure and the character for it is not clear. The drawing is possibly intended for a vessel spilling over.

The latter two names are grouped together separated by dots and a line from the next four. They belong to the Deer clan.

28/10. *Hoyonnyénnih* (Oa.), "He was made to do it."—H. Skye.

The next four characters are crowded into a corner of the notebook page and one can not be certain in what order to read them. On the assumption that the top two and the first character at the bottom are meant to be followed by three dots to segregate them as a class apart from the last, then a man's head atop an object drawn across the base of the neck may stand for this title.

29/11. *Shodegwáasen'* (Oa.) or *Shodegwáahshon'*, "He the bruiser," or "He smashes it again."—S. Gibson; "Bruised repeatedly."—H. Skye.

At the lower left there is a full-size figure of a man of gigantic proportions, but the figure at the upper right does not help.

30/12. *Shagogénhhe'* (Oa.) or *Shagogénhhee'*, "He saw the people."—S. Gibson; "He sees her (them) occasionally."—H. Skye.

These three chiefs of the Eel clan comprise a group to themselves.

31/13. *Ho'sāhhdahwih* (Oa.) or *Ho'sāháhhwih*, "He bears a aloft a torch."—S. Gibson; but possibly just a name, although the Onondagas sometimes discuss the possibility of *Hoda'skwishá'hwih*, "He bears a tomahawk in his belt."—H. Skye.

This is the name that determines whether there are 49 or 50 chiefs in the League. The name appears in the first writing of the Abram Charles text for the Eulogy (p. 16), but at the bottom of the same page occurs, "1923 He says again *Ho'sa'há'hwi'* is not a title of a Federal Chief." Nevertheless, this name was recounted as part of the Roll Call, an Onondaga chief was installed in this title, but in recent times a controversy arose between the Cayugas and the Onondagas as to whether this title belonged to a separate individual or to the next chief.[10]

The last character, a male head, must stand for two titles.

32/14. *Sganawáadih*, "Across the swamp," "Over the river," or "Across the rapid."

The text implies that the last two names were additions to the roster in later times. One was a great war chief whose body was riven in twain, being both a warrior and a councilor; hence the argument that one man occupied both offices. The first is of the Turtle clan. Hale says that *Skanawati* was the divided personality (p. 161). The Turtle clan claimed this name.

THE CAYUGA PICTOGRAPHS

33/1. *Dega'ényonh* (Oa.) or *Haga'ényonh* (C.), "Wonderer."

Possibly because he was a Cayuga chief himself, Abram Charles evidently did not feel the need to provide himself with a set of drawings for remembering the Cayuga list. His notebook contains merely a design of spaced dots to indicate the number and groupings of the Cayuga chiefs: . . . . . (2–3–3–2). The characters across the top of the same notebook page (Fig. 5) are of the Onondaga titles, but out of order. Simeon Gibson held this opinion, which

[10] On the question of the number of chiefs in the League, Mr. Hewitt left this note:

"With the final amendment to the constitution of the Iroquois League, admitting and installing the last two chief warriors of the Seneca as federal chiefs, the final number of *Rodiyánehr*, Federal Chiefs, became 49, which is the only number recognized by the ritual of the Eulogy of the Founders. This number was never increased, notwithstanding the adoption of the Tuscarora, the Nanticoke, and the Tutelo with their chiefs with sittings in the Federal Council Chamber. The most probable reason for this failure to add these official titles to the said ritual seems to be because the newly adopted chiefships had nothing whatever to do with the founding and institution of the League.

"Every one of these 49 Federal officials belonged to some one *ohwachira* or uterine family, which probably had its own peculiar tutelary name taken from some bird or animal. One or more of these *ohwachira* was organized into a higher unit—the clan. The three Oneida and the three Mohawk clans have three of these *ohwachiras*. . . ."

FIG. 5.—List No. 2: Onondaga titles (5–14; 1–6) and Cayuga groupings.

can be substantiated by comparing this set with the other Onondaga pictographs (Fig. 4). Taking the Onondaga list above, the order is: 5 6/7 /8 9/10 11 12/13* 14//1 2 3 4. Some difficulty is encountered in adjusting the characters to the first and the last titles. Further, it is evident that when Chief Charles made this set of drawings he then regarded the thirteenth title, that of the disputed *Ho'sähdahwih* as a separate office. Therefore, it may be that the list that we described in enumerating the Onondaga titles was of later composition.

34/2. *Gadji'nondawéheh* (Oa.), *Gadjinon'dawéhheh* (C.), or *Dji'nondawéeyah*. The interpretation of this name is uncertain. "Coming on its knees" (Hale), "Calls a summons" (?).—S. Gibson, and "Manipulating bugs."—H. Skye.

This and the previous title belong to the two leading chiefs of the Cayuga tribe, who are as father and son to each other. They preside as judges in the Cayuga council. The first is of the Bear clan, the second of the Hawk or "Ball" clan.

35/3. *Gadagwáadjih* (Oa.) or *Gadagwáase'* (C.), "Mashed," or "Softened."—S. Gibson.

This title and the next two belong in a group who are related as "brothers."

36/4. *Shoyónwees* (Oa.) or *Shonyónwes* (C.), "His guts are long." "He has a long wampum belt" (Hale).

37/5. *Hadya'sénhne'* (Oa.) or *Hadyásénne'*, "He repeats (or rehearses) it." "He puts one on another, piles it on" (Hale).

These are a group to themselves. The first two belong to the Bear clan; the third to the Turtle clan.

38/6. *Deyoenhhyóngoh* (Oa.) or *Thowenhyóngoh* or *Deyoronhhyóngoh* (C.), "Reaches the sky."

39/7. *Deyothhowéhgwih* (Oa.), "Doubly cold."

40/8. *Deyawenhethhon'* (Oa.), "Two things happen," "Double event." *Thaonhwéthon'*, "Mossy place" (Hale).

This is the number of colleagues in this group, but the next one belongs in the same phratry, although they are called cousins to each other. Six and Seven are Wolf clan chiefs; Eight is of the Killdee, Small Plover, or Snipe clan. Hale ascribes it to Wolf.

41/9. *Hadonhdahhéhha'*, "He shoulders a log (?)."—H. Skye; "Crowding himself in" (Hale).

This title belonging to the Large Plover lineage is in the same phratry as the preceding group, and his cousin across the fire is his colleague who follows. Hewitt's notes say that the latter two are brothers, but the text declares them "Cousins." The last chief is of the Bear clan.

42/10. *Desgáahe'* (Oa.) or *Desgáhhe'* (C.), "He does something (?)."

It is not clear what this chief does. The present holder of the title, Chief Alex General of the Upper Cayuga band at Sour Springs, Six Nations Reserve, holds that the name means "More than Eleven."

This ends the Cayuga roster.

THE SENECA PICTOGRAPHS

[In turning to the last tribe of the League we once more return to Hewitt's manuscript.]

43/1. *Skanyadáiyo'* or *Sganyadáiiyo'*, "It is a beautiful lake (Handsome Lake)" or, literally, "It is a very large lake." [As given these names are Onondaga or Cayuga, not Seneca forms.]

There are two sets of Seneca pictographs. On Seneca List No. 1. (Fig. 4), this title is depicted by a circular design having radial lines from its center to the perimeter. On List No. 2 the character is merely a circle.

The Seneca councillors are linked in pairs of opposite moieties. As such they are cousins to each other. The first title belongs to the Turtle clan, the next to the Great Plover or Snipe.

44/2. *Sha'tekáonhyes*, or *Tca'degaénhyes*, "Two skies of equal length."

On both lists this title is represented by a character resembling the letter **D**; it is sometimes represented by two arcs of the celestial sphere. A line having dots along its left margin appears on one list, a line on the other, to separate the first pair of titles from the second.

45/3. *Shagen'djóowanenh* or *Shagen'djóowane'*, "He of the large forehead."

This chief is depicted on both lists by a full face that accentuates the brow region over the eyes.

This title belongs to the Hawk clan, being in the same moiety as the second title, and his colleague, who sits across the fire as cousin of the first two, is of the Bear clan.

46/4. *Satyénowaht* or *Sadyénawat*, "Do thou take hold of it"; "He grasps it."—S. Gibson.

Hewitt placed this name fourth on the list, although it is sixth on the Seneca roster in the Eulogy or Roll Call text by Chief Abram Charles and in a combined list of the same date (1917) attributed to Chief Charles and to the Mohawk chief Seth Newhouse.

On List No. 1 (Fig. 4) the fourth title is represented by a character that neither Hewitt nor I could interpret. On the strength that the character stands for the name listed by Hewitt for it, Simeon Gibson ventured that the vertical line was a pole grasped by two hands. This idea gains some strength from List No. 2. An arrow, however, appears at this same place on the Cayuga Condolence Cane of Andrew Spragg, and the same object was possibly intended by Chief Charles. Since these two old Cayugas lived as neighbors on the Six Nations Reserve and used to collaborate in teaching the roll call to younger men, we may assume that they agreed on the order of Seneca chiefs. Moreover, Chief Charles was also a poor draftsman. In view of the texts, the verbal lists of the Chiefs, and the Cayuga Condolence Cane, we find also:

46/4. *Ga'nóogai'*, a title for which neither of us has discovered a satisfactory translation. The title suggests the homophonic word *gá'non* (S.), "arrow," which possibly helped the chiefs of recent years to remember the name. In Seneca the title is *gá'nogai'*, in contrast to the Onondaga above, which they translate as "chewer, biter, or killer." At least the name has this meaning to the Tonawanda Senecas.

This title belongs to the Turtle clan.

FIG. 6.—The Fourteen Matters of Requickening.

A line on both lists separates the second and third pair of Seneca chiefs.

47/5. *Onishayenén'ha'* or *Nishaanyénen't* (?). Simeon Gibson interpreted the former as meaning, "A man leaning nearly over," the latter as "Falling day," which it means to the Tonawanda Senecas. Small Plover or Snipe clan claims it.

On the first list a long object inclines to the right; on the second set of drawings a simple line inclines to the right. In either case the verb in this name denotes something falling from an upright position.

48/6. *Ka'nóokai'* (J.N.B.H.). (Cf. 46/4).

To Hewitt this character, the fifth on the Seneca List No. 1 (Fig. 4), suggested a stump having sprouts and two roots, but the design on the second set of drawings he found still less recognizable. The forty-eighth symbol on the Cayuga Condolence Cane of Andrew Spragg is similar in appearance to the character on Chief Charles first set of drawings (Fig. 4). It is a hand or bear paw or turtle foot having five claws or fingers. Both the Charles text for the Eulogy or Roll Call and a combined list of chiefs by Charles and Seth Newhouse would attribute this character to the name *Sadyénawat* (46/4), which we repeat here:

48/6. *Sadyénawat*, "Grasps it," which is consistent with the drawing as interpreted. Bear clan.

Another line segregates the latter pair of titles from the last two, which belong to the Doorkeepers of the Longhouse of the League.

49/7. *Kanonhkari'dáhhwi'* or *Ganonhgei' dáawi'*, "Its hair is singed," or "It broils." Snipe clan.

Hewitt interpreted the drawings on both lists as representing a bed of live coals.

50/8. *Teyoninhhoká'wenh*, *Deyoninhhogá'wenh*, "It keeps the doorway open"; literally, "It holds up the door-flap," referring to the ancient bark or skin door hinged at its top in the longhouse of the League. "Open Door" is the simpler rendering of Hale, and of Howard Skye.

This official is symbolized by characters representing an open doorway.

"This is the roll of the founders of the Great Peace; Hail Grandsires."

THE SYMBOLS OF THE FOURTEEN MATTERS

There remains to describe, only the set of symbols for remembering the 14 Matters of Requickening, which are perhaps the most interesting of the lot (Fig. 6). The Requickening Address is already in print, so the task of collating the drawings and the burdens of the address is not difficult. The list of burdens as given by Chief Charles faces a plate of the wampum strings that accompany the messages of condolence on pp. 78–79 of our previous article (this JOURNAL 34). Chief Charles covered one page of his notebook with 14 drawings, mostly crude outlines of the human form in the same style as his drawings of the chiefs' titles. Each of the drawings (Fig. 6) stands for one of the sections of the great requiem address for Condolence and Installation of Chiefs in the League. Only one symbol is lacking. There is none to represent death of a chief by murder.

Through the awful devastation of Death the phratry of the deceased chief have lost their faculties and their organs have been damaged; these are restored to them in the following stages:

1. *Ogáhthri*, "One's eyes"—drawing of a man pointing to his eyes.

2. *Hahondagáronde'*, His ear openings: Hearing—drawing of a stoop-kneed man with large ear.

3. *Dehanya'dóogen*, "Where is throat forks," his throat is full: Speaking—drawing of a man with round object in his throat.

Here three vertical lines indicate a hiatus; so many matters are recounted At the Wood's Edge where the mourners meet the condoling phratry.

4. *Eya'dagónwah*, "within his breast (body)"—drawing of a man with sketchy internal organs pointing to his mouth.

5. *Ondyendákkhwa'*, "One's customary resting place": The bloody husk mat bed—drawing of rectangular object.

6. *Dayó'gaah*, "The deep darkness of grief"—drawing of man with deep halo around his head.

7. *Wa'hodronhyáhdon'*, "He has lost sight of the Sky": Loss of the Sky—drawing of long-necked man seeking the sky.

8. *Wa'hodrahgwáhdon'*, "He has lost sight of the Sun"—moon-faced figure seeking the Sun.

9. *Heyo'daagwáinda'*, "At the Grave, at the mound of fresh earth"—drawing at lower left to represent dirt piled on grave.

10. or 11. *Dewáhshen niyóihwaks*, "Twenty

matters," the cost for homicide or (11), *deyonshdjisdadónhkwa'h*, "Around the fire place," at the hearth of the home: the Council Fire—an &-shaped character with what may be intended for 20 in the loop and three marks following. [Double numbering arises if No. 10, Murder is omitted.]

12. *Onthonwi'sas*; *hohsken'engéhda'*, "Woman and Warrior." These are grouped together in the Requickening Address, but apparently the third figure with long hair in the lower set of drawings is the Matron; the next wearing a hat is Warrior.

13. *Hoyáaneh*, "The Federal Chief"—the latter, possibly.

14. *Hyáhden de'aonhwendjana'gówas*, "Anything can happen on earth"—even suicide or insanity: the Mind's loss of reason—the next to the last drawing seems to have been intended to represent dementia.

15. *Gahashráhee'*, "The Torch"—the last figure may be intended for a torch of hickory rind such as was formerly used to illuminate night councils. But it may also be intended to represent a "short string." The name of the last string in Requickening is also *gahásheɛ'*, "light," being the short string at the end of the set. According to Howard Skye, at the end of the ceremony the short string is put over the pole for both tribal phratries to take up if any danger arises, when they say of it, "*dewakdá'a henganonhsókden*', very quickly the news of it passes through the house (League)."

So ends the Condolence Council.

PALEONTOLOGY.—*Four new species of fossil cyprinodont fishes from eastern California.*[1] ROBERT R. MILLER, U. S. National Museum.

The fossil fish fauna of the desert region of eastern California has hitherto received no serious attention. During my detailed studies of the living fishes of this area (Miller, 1943*a*, *b*; 1944) fossils were available for comparison with the Recent forms. Although the material is rather fragmentary it contains at least three distinctive species and one other that, though incompletely preserved, is apparently without a living representative. A careful survey for fossil fish remains is needed and would no doubt reward the investigator with important finds.

The material described below was lent by the Department of Paleontology of the California Institute of Technology, the Museum of Paleontology of the University of California, and the University of Michigan Museum of Paleontology. I am grateful to the authorities of these institutions for allowing me to examine and report upon their specimens. Dr. Carl L. Hubbs aided in the identifications and read the manuscript. J. R. Alcorn, of Fallon, Nev., kindly obtained comparative material of *Fundulus nevadensis* (Eastman) from the Lahontan beds in the vicinity of Hazen, Churchill County, Nev. Curtis J. Hesse, late curator of the Museum of the Agricultural and Mechanical College of Texas, kindly supplied advance information on the nature and disposition of the Death Valley material, on which he had done some preliminary work.

Family CYPRINODONTIDAE: Killifishes

This group is best represented by material from Death Valley. I also had for comparison good specimens of the cyprinodont described as *Parafundulus nevadensis* from the Lahontan basin by Eastman (1917, p. 291, pl. 16, fig. 2; pl. 17; pl. 18, fig. 3), herein regarded as a species of *Fundulus*.

Genus **Fundulus** Lacépède

Fundulus curryi, n. sp.

Types.—The holotype (Fig. 1), a specimen approximately 44 mm in standard length, California Inst. Tech. no. 10239, Loc. 335, was collected by H. Donald Curry. It is a nearly perfect specimen except for the fact that the head end is crushed and represented chiefly by impression. Enough of the details are clear, however, to allow definite statements to be made concerning the size of the jaws, eye, etc. Nos. 10240, 10247 (smaller slab), and 10249, all from locality 335, are designated as para-

[1] Excerpt from a dissertation submitted in partial fulfillment of the requirements for the degree of doctor of philosophy in the University of Michigan. Published by permission of the Secretary of the Smithsonian Institution. Received April 20, 1945.

types. Nos. 10242 and 10246, from the same place, are also referred to *curryi*.

Horizon and type locality.—Reportedly lower Oligocene beds of the Tertiary Titus Canyon formation; 3 miles southeast of Chloride Cliffs in the Funeral Mountains, T. 15 S., R. 1 E. (Furnace Creek quadrangle), on the east side of Death Valley National Monument, Inyo County, Calif. The assignment of these beds to the lower Oligocene is very questionable. Preserved with the *Fundulus* is a single specimen referrable to *Cyprinodon*, a genus of recent origin previously unknown in fossil form.[4] This specimen is described in detail on following pages. The presence of a *Cyprinodon* in these beds strongly suggests that they are no earlier than Late Pliocene. In a letter dated December 18, 1942, Edwin C. Alberts, naturalist of Death Valley National Monument, stated that the type locality of the Titus Canyon formation is definitely Oligocene. This determination is based on the skeletal remains of a titanotherium. However, Mr. Alberts wrote that the place where the fish remains were discovered is several miles distant from Titus Canyon proper and "the dating of this site as Titus Canyon Formation was on purely lithologic grounds."

Diagnosis.—A *Fundulus* with the dorsal fin inserted very slightly in advance of the anal and with both of these fins posterior in position, the dorsal with 14 to 15 rays, the anal with 15 to 16 rays. The body and caudal peduncle are short and deep. There are about 30 to 31 vertebrae including the hypural.

Description.—The holotype has the dorsal inserted slightly in advance of the origin of the anal fin, with 14 or possibly 15 rays. A line connecting the point of origin of dorsal and anal fins makes an angle of about 85° with the body axis. The anal fin, with 16 rays, is rather long and rounded. Both of these fins are located far back on the body, well behind its midpoint. The small pelvics lie about midway between the tip of the snout and the caudal base, and consist of 6 (?) rays. The pectoral fins, both crushed, have at least 14 and probably 15 or 16 rays. The end of the caudal fin is missing, but enough of the rays are present to indicate a count of at least 19 and probably 20 principal rays (the branched rays plus 2). The length of the head enters the standard length about 3.6 times, and the body depth, over the origin of the dorsal fin, enters this distance 3.5 times. There are 10 or 11 precaudal and 20 caudal vertebrae, making a total of 30 to 31 vertebrae. The length of the base of the anal fin is about equal to the depth of the caudal peduncle, and enters the length of the peduncle about 1.5 times. The anal base is almost as long as the distance from the anal to the pelvic origin. The depth of the peduncle enters its length about 1.4 times. The lower jaw is strong and projecting, the eye large.

No. 10240, a paratype of *curryi*, has the posterior half of the body missing and the head crushed. The standard length, estimated by multiplying the head length by 3.5 (the ratio of head length to standard length in the holotype), was about 65 mm. The dorsal fin is inserted very slightly in advance of the anal, the line connecting the origins of these fins making an angle of about 87° with the body axis. The dorsal fin has 14 or 15 rays; the anal fin has approximately 16 rays; the pelvics are definitely 6-rayed. The pectorals are badly crushed but probably have 15 or 16 rays. The body depth is 3.0 in the estimated standard length. This fish is very deep-bodied forward, like big males of *Crenichthys*, a living cyprinodont of eastern Nevada (Hubbs, 1932, pl. 1; Hubbs and Miller, 1941).

No. 10249, also a paratype, has the dorsal, anal, and pelvic fins intact. The standard length of this specimen is estimated to have been approximately 66 mm (distance from anal to pelvic origins, 11 mm, times 5.5). The dorsal has 14 or 15 rays, the anal 15 or 16. A line connecting the origins of these two fins makes an angle of 85° or 86° with the body axis, as in other specimens of *curryi*. The pelvics are 6-rayed. The depth of the body at the dorsal origin enters the estimated standard length 3.1 times.

A few scale imprints, most prominent about the base of the dorsal fin in this specimen give information concerning the size, shape, and structure of the scales in *curryi*, and the age of this individual. This is the only specimen of *curryi* on which I was able to find any trace of

[4] *Cyprinodon* (?) *primulus*, based on scales only, was recently described by Cockerell (1936, pp. 3–4, fig. 1) from the Tertiary of northern Argentina. It seems unlikely that the scale figured by Cockerell even belonged to a cyprinodont fish, and it very definitely is not to be referred to *Cyprinodon*.

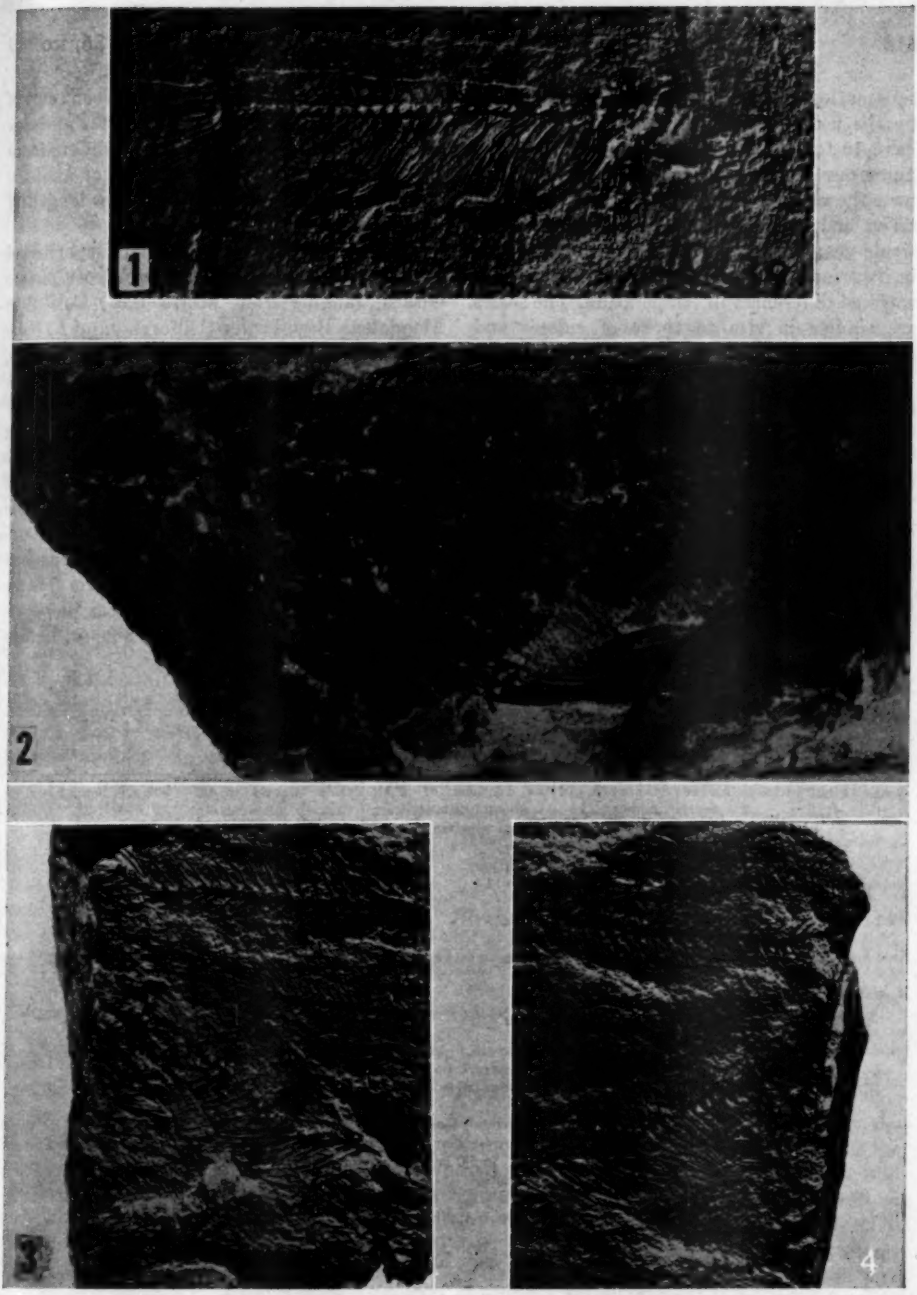

FIG. 1.—Holotype of *Fundulus curryi*, California Inst. Tech. no. 10239, about 44 mm in standard length. FIG. 2.—Holotype of *Fundulus eulepis*, United States National Museum no. 16883, estimated length 93 mm. FIG. 3.—Left half of holotype of *Cyprinodon breviradius*, California Inst. Tech. no. 10245, estimated length 33 mm., lying at an oblique angle on the matrix, the anterior end pointing downward toward the right lower corner and the posterior part terminating near the middle left center. Above the type are two well defined, partial specimens referred to *Fundulus eulepis* (see text) and parts of others which may belong to that species. FIG. 4.—Right half of holotype of *Cyprinodon breviradius*, representing the mirrored image of the opposite half shown in Fig. 3.

squamation, and this was made possible only by the use of very bright light. These scales have 10 to 11 radii, are imbricated, and have numerous circuli—as in *eulepis*. The focus is near the scale center. One scale near the posterior end of the incomplete specimen has a single year mark, indicating that this fish was in its second year and that there were marked seasonal differences in temperature. The scales are similar in size to those of *eulepis* and *davidae*, described below.

No. 10247 (smaller slab) is also designated a paratype of *curryi*. The pelvics, anal, and caudal are largely intact and enough of the body in the region of these fins is present to indicate that the specimen was deep-bodied. There are about 16 rays in the anal fin and six in each pelvic fin. The length of the anal fin base is a little difficult to discern but it appears to enter the length of the peduncle about 1.5 times, as in the holotype of *curryi*. The caudal vertebrae number 20 to 21.

The diagnostic differences between *curryi* and closely related fossil species of *Fundulus* in the West are given in Table 1. It differs from all of these in the greater number of anal fin rays and the correspondingly greater length of the anal fin base.

Compared with the only living species of *Fundulus* on the Pacific coast, *F. parvipinnis* Girard, ranging from Morro Bay, Calif., to Magdalena Bay, Lower California, and *F. lima* Vaillant, inhabiting springs at San Ignacio, Lower California, the fossil species is seen to differ greatly in the position of the fins. Both the dorsal and anal fins are more posterior in *curryi*, particularly the anal, whereas the pelvic fins are located midway between the caudal base and the tip of the lower jaw, as in the living species. This posterior shift in the unpaired fins but not in the pelvics stands out very clearly in the fossil for the pelvic fins lie well in advance of the anal, whereas in *parvipinnis* and *lima* the pelvics reach or nearly

TABLE 1.—DIAGNOSTIC DIFFERENCES BETWEEN FOUR SPECIES OF FOSSIL FUNDULUS FROM CALIFORNIA AND NEVADA

Character	*nevadensis* (Lahontan Basin)	*eulepis* (Death Valley)	*curryi* (Death Valley)	*davidae* (Mohave Desert)
Position of dorsal fin	Well in advance of anal; nearly midway between origins of pelvic and anal fins.	In advance of anal; about ¼ distance from anal to pelvic origins.	Only slightly in advance of anal fin; very much nearer anal than pelvic fins.	Slightly behind anal fin.
Dorsal fin rays	11 to 12	13 to 14	14 to 15	11 or 12
Anal fin rays	10 to 13	13 to 14	15 to 16	11 or 12
Anal fin	Lobate.	Posterior rays elongated.	Broadly rounded.	Broadly rounded.
Base of anal into length of peduncle	1.7 to 1.9	1.7 to 1.9	1.4 to 1.5	2.3
Caudal peduncle	Long and slender, its depth about 2.5 in its length.	Moderately long and slender, its length about twice its depth.	Short and deep, its depth about 1.5 in its length.	Short and deep as in *curryi*.
Body	Long and slender its depth 6.5 to 8.0 in standard length.	Moderately long and slender, its depth about 4.5 to 5.0 in standard length.	Short and deep, its depth 3.0 to 3.5 in standard length.	Rather deep, its depth 4.0 in standard length.
Head	Very large and heavy, about 3.0 in standard length.	Probably similar to *curryi*.	Shorter, about 3.5 in standard length.	As in *curryi*.
Scales	Very small, circular, nonimbricated; about 4 radii and 5 circuli on largest; 65 or more in lateral series.	Moderately large, rectangular, rounded at apex, inbricated, with focus behind scale center; 8 to 12 radii, often exposed; many circuli; probably about 45 to 50 in lateral series.	Similar to *eulepis*.	Similar to *eulepis*.

reach the base of the anal fin. *F. curryi* also differs from these Recent forms in having more rays in the anal fin (10 to 13, usually 11 or 12, in *parvipinnis* and *lima*), and it appears to have been deeper-bodied than *F. p. parvipinnis* Girard, the northern subspecies of *Fundulus parvipinnis*. The southern subspecies, *F. p. brevis* Osburn and Nichols, and *F. lima* are about as deep-bodied as the fossil. In the several specimens at hand, there is nothing to indicate that the anal fin is elongated as it is in the males of *F. parvipinnis* (but not in *F. lima*).

Etymology.—It is a pleasure to name this new species in honor of H. Donald Curry, former park naturalist of Death Valley National Monument, who was actively engaged in studying the geology and paleontology of Death Valley.

Fundulus eulepis, n. sp.

Types.—The holotype (Fig. 2), estimated to have been about 93 mm long, is U.S.N.M. No. 16883, found by H. Donald Curry on December 5, 1935. It is more than half missing, but the body is intact between the pelvic fins and the middle of the caudal peduncle.

Horizon and type locality.—Furnace Creek Tertiary section; approximately 6 miles southeast of Furnace Creek Ranch in the Black Mountains (Furnace Creek quadrangle), on the east side of Death Valley National Monument, Inyo County, Calif. The original (U. S. Geological Survey) label reads, "Fossils are from beds interstratified with the Furnace Creek Tertiary Section."

Diagnosis.—A large *Fundulus* with the dorsal fin inserted well in advance of the anal, about one-third of the distance from the anal to pelvic origins, the dorsal and anal fins with the same number of rays (13 to 14), with a long, slender body, and with the anal rays elongated posteriorly.

Description.—The dorsal fin of this species, unlike that of *curryi*, is well in advance of the anal. In the holotype a line connecting the origins of the dorsal and anal fins makes an angle of approximately 79° with the body axis. The estimated length of about 93 mm was derived by multiplying the distance between the origins of anal and pelvic fins by 5.5, as the standard length is 5.5 times this distance in *curryi*. On the assumption that the pelvics lie about midway between the snout and caudal base, and estimating the position of the end of the hypural, a value of 90 mm is attained. Presumably this is a rougher estimate than that of 93 mm, because it is based on two (rather than one) assumptions. The close agreement indicates that the fish was probably not less than 90 mm in standard length. The dorsal fin has 13 or 14 rays, the anal fin, elevated and pointed posteriorly, has about 13 rays. The length of the last anal ray is two-thirds or more the length of the anal base. The pelvic fins, one of which is complete, have 6 rays. The pectorals and caudal are missing. The body depth enters the standard length about 4.7 times, indicating a slender body. The length of the anal base is approximately 1.9 in the length of the peduncle and 1.5 in the depth of the peduncle. The specimen is covered with scales, which are moderately large, possess 8 to 10 radii and many circuli, and have the focus behind the scale center. The radii are commonly exposed but the scales are imbricated, not separated by actual gaps as in *nevadensis*.

A paratype (U.S.N.M. No. 16884) is represented almost wholly by the head. There are strong teeth on the upper and lower jaws which, along with the broad, strong maxillary, massive mandible, and large size of the species, indicate a predatory type. These teeth are conical, rather thick, and nearly straight or slightly curved toward their tips. The largest tooth in the upper jaw measured 0.9 mm in length, that of the lower jaw 1.0 mm. If the head length (here about 30 mm) was approximately one-third the standard length, this specimen was very similar to the holotype in size.

A third specimen (U.S.N.M. No. 16885), designated as a paratype of *eulepis*, is represented almost wholly by beautifully preserved scales. These are rectangular, rounded at the apex, with 8 to 12 radii and with the focus behind the scale center. The circuli are fine and numerous, 23 to 25 or more. At least one sharp annulus is clear, suggesting that winters were cold when *eulepis* lived. On several particularly well-preserved scales, two annuli are visible, much closer together than the distance from the focus to the first annulus. This indicates that growth was rapid in the first year, and suggests that the decreased growth rate at the end of the first year was correlated with the attainment of maturity.

Other specimens contained on two pieces, Calif. Inst. Tech. No. 10245, from the type locality of *F. curryi*, are referred to *eulepis*. These fish, of which half are on the one piece and half on the other (Figs. 3 and 4), are too slender to be assigned to *curryi*. The largest one has the dorsal fin well in advance of the anal, with about 13 rays; the anal has 13 or 14 rays, of which the posteriormost are elongated. The anal base is 1.7 in the length of the peduncle; the peduncle is slightly more than twice as long as deep. The depth of the body at the dorsal fin is only 1.7 in the length of the peduncle. In *curryi*, the depth of the body at this point is much greater than the length of the peduncle. It is not known whether the formation containing this species and *curryi* is contemporaneous with that containing *eulepis*, but since the slender form coexistent with *curryi* appears to be indistinguishable from *eulepis*, it seems best to tentatively refer it to *eulepis*.

Etymology.—The name *eulepis*, meaning well-scaled, refers to the close-set, numerous scales found on the holotype.

Fundulus davidae, n. sp.

Types.—The holotype is the specimen represented by the right and left halves of the two pieces of matrix marked California Inst. Tech. no. 10276. It was received by Dr. Lore David from a wildcat oil driller.

Type locality.—Mohave Desert near Black Mountain (U.S.G.S. Searles Lake quadrangle), about 40 miles northwest of Barstow and 25 miles southeast of Johannesburg, northwestern San Bernardino County, Calif. The horizon has not been determined, but the appearance of the matrix suggests that it may be of Pliocene or early Pleistocene age.

Description.—The holotype, and only known specimen, is about 35 mm long. Its two halves represent a nearly complete fish. The dorsal fin is inserted slightly behind the origin of the anal, and has about 11 or 12 rays. The anal fin has 11 or 12 rays. Both of these fins are well behind the midpoint of the body. The pelvics, probably 6-rayed, reach about halfway to the anal origin and are more posterior in position than in the other fossil species. They definitely lie much nearer the caudal base than the tip of the snout. The pectorals are crushed, with 15 or 16 rays. The caudal fin is represented chiefly by impression and probably had as many principal rays (20) as in the previously described fossil species.

The length of the head is about 2.9 in the standard length, and the body depth at the dorsal origin is about 4.0 in this distance. The depth of the caudal peduncle approximately equals its length. The length of the anal base enters the peduncle length 2.3 times and is about 1.3 in the distance forward from anal to pelvic origins. There are approximately 30 vertebrae, 11 precaudal and 19 caudal.

The scales are moderately large and imbricated as in *eulepis* and *curryi*, with a few of the radii occasionally exposed. The circuli are much more numerous than in *nevadensis* but appear to be fewer than in *eulepis*. The scales on the opercle are large, as in many cyprinodonts, numbering about 15 in all. I estimate that there were 45 to 50 in the lateral series, as there probably were in *curryi* and *eulepis*. This is a greater number than in the living species of the Pacific slope (about 30 to 37), but much fewer than in the fine-scaled fossil species, *Fundulus nevadensis*.

A cyprinodont described by Jordan (1924, pp. 45–47, pls. I–J) as *Parafundulus erdisi* from northern Los Angeles County[3] appears, from the figures, to resemble *Fundulus parvipinnis* more closely than it does any of the known fossil species of *Fundulus* except *davidae*. *F. davidae* has a somewhat deeper body and more posterior dorsal and anal fins. The distance from the end of the hypural to the origin of the dorsal fin enters the standard length at least 3.5 times, rather than 2.8 to 3.1 times as measured from the figures of *erdisi*. The base of the anal fin in *davidae* enters the caudal peduncle about 2.3 rather than 1.3 to 1.6 times as in *erdisi*. In that species the dorsal lies in advance of the anal whereas in *davidae* it is behind the anal origin. This difference is not great, however, and may be related to sexual dimorphism. The larger specimen figured by Jordan may be a male, for the anterior rays of the anal fin appear to be elongated as in males of *parvipinnis*.

Jordan (1925, p. 43) pointed out that *Parafundulus* is probably not distinct from *Fundulus* and it is regarded herein as a synonym of *Fundulus*.

[3] No definite age was assigned to these beds in the original account, but Jordan later wrote (1925, p. 43) that the genus *Parafundulus* was probably Pleistocene.

Etymology.—This species is named after Dr. Lore R. David, an eminent student of the fossil fish faunas of California, who recognized it as an undescribed form of *Fundulus*.

Genus **Cyprinodon** Lacépède

Cyprinodon breviradius, n. sp.

Types.—The holotype (Fig. 3) and only known specimen of this species is the individual represented by the right and left halves of the two pieces of matrix labeled No. 10245, Loc. 335, Calif. Inst. Tech. It was collected by H. Donald Curry and is nearly complete except that the head end is missing. However, the shape of the body, the position of the fins, the number of fin rays, and the small size of the hypural all strongly suggest that the fossil is a member of the genus *Cyprinodon*. Unfortunately it cannot be stated whether the teeth were tricuspid.

Horizon and type locality.—The horizon and type locality of *C. breviradius* have been described under the discussion of *Fundulus curryi*.

Description.—The holotype is estimated to have been about 33 mm long. The small fins suggest that it is a female. The dorsal fin, with 10 or 11 rays, is anterior in position as it is in *C. macularius* Baird and Girard, the species now living in the lower Colorado River Basin (Miller, 1943*a*, pp. 12–13, table I, pls. 1, 2). The origin of the dorsal fin lies almost over the origin of the pelvic fins. The anal fin has 10 or 11 rays and originates almost directly below the end of the second third of the base of the dorsal fin. The pelvics, composed of 6 or 7 rays, apparently do not reach more than half the distance to the origin of the anal fin. The pectoral fins are missing, and only the basal part of the caudal fin is present.

The depth of the body at the dorsal origin enters the distance between the insertion of the pelvic fins and the caudal base about 1.5 times. The distance between the last dorsal ray and the end of the hypural approximately equals the body depth. Both the dorsal and anal fins, particularly the anal, appear to have been small, even smaller than in *Cyprinodon salinus* Miller, the Recent species of Salt Creek, Death Valley (Miller, 1943*b*, pl. 1).

There are about 20 caudal vertebrae, which is a greater number than in most of the living species of the region.

Cyprinodon breviradius resembles *C. macularius* in the position of the dorsal and pelvic fins, but is more slender-bodied. In that feature it is similar to *C. salinus*.

Etymology.—The name *breviradius*, meaning short-rayed, refers to the short rays of the dorsal and anal fins.

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BOTANY.—*Two new species of* Scleria *from the Upper Amazon Valley.*[1]

EARL L. CORE, West Virginia University. (Communicated by E. P. KILLIP.)

Among specimens of *Scleria* recently collected by J. T. Baldwin in the state of Amazonas, Brazil, and by José Cuatrecasas in the commissaries of Vaupés and Caquetá, Colombia, were the following two new species. Types are in the U. S. National Herbarium.

Scleria scandens, n. sp.

Culmo alto scandente, acute triquetro, retrorsim scaberrimo, 5 mm crasso; foliis 5–8 mm latis, rigidis, glabris, costa subtus et marginibus retrorsim scabris; vaginis exalatis, pilosis, ligula brevissima, rigida; paniculis numerosis, purpurascentibus, pedunculis gracilibus; spiculis numerosis; squamis glabris; hypogynio stipitiforme, 1 mm longo, quam achenio angustiore, apice trilobo, lobis rotundatis; achenio albo vel purpureo-maculato, 1 mm longo, 2 mm lato, glabro, apice truncato umbonato.

Rhizome not seen; culms climbing, several feet long, 5 mm thick, sharply triquetrous, retrorsely scabrous, leaves numerous, 5–8 mm wide, rigid, glabrous, the midrib beneath and the margins very retrorsely scabrous; sheaths wingless, pilose; ligule short, rigid; panicles numerous, axillary and terminal, purplish, the peduncles slender, flattened; spikelets numerous in each group; scales purple, glabrous or nearly so; hypogynium stipelike, 1 mm long, narrower than the achene, 3-lobed at the apex, the lobes rounded; achene white, purplish black where exposed, 1 mm high, 2 mm broad, essentially glabrous, the apex truncate, umbonate.

BRAZIL: Ilha Nova Vida, upper Rio Negro, Amazonas, February 12, 1944. *Baldwin* 3285, Type in U. S. National Herbarium.

This species is closely related to *S. splitgerberiana* Henrard, of Surinam, but differs in its more robust habit, larger panicles, and smaller, glabrous achenes.

Scleria grandis, n. sp.

Rhizomate ligneo, squamis atro-rubris intecto; culmo 1–2 m alto, triquetro; foliis 5 dm longis, 18–45 mm latis, in marginibus scabris; vaginis ampliatis, alatis; ligula abbreviata, rotundata, rigida; panicula terminali, solitaria, densa, conica, straminea, 5–15 cm longa; bracteis foliaceis, 20 cm longis; spiculis masculis longe pedicellatis, numerosis; spiculis foemineis paucis, in ramorum basi subsessilibus; squamis masculis anguste mucronatis; squamis foemineis ovato-lanceolatis; hypogynio trilobo, lobis ovatis; achenio 3 mm longo laevi triangulari, albo vel interdum griseo, hirtello. *Scleriae cyperinae* proxime affinis.

Rhizome thick, hard, covered with red-brown scales; culms 1–2 meters tall, robust, sharply triangular; leaves about 5 dm long, 18–45 mm wide, somewhat scabrous on the margins and midrib beneath; sheaths winged, often conspicuously so, the wing-margins slightly scabrous; ligule rotund, the margins rigid, without an appendage; inflorescence solitary, terminal, conic, dense, straw-colored, 5–15 cm long; bracts foliaceous, mostly 3, 20 cm long or longer, 18–35 mm wide; bractlets filiform, minute; staminate spikelets long-pedicelled, linear, very numerous; pistillate spikelets subsessile, few; staminate scales narrow, straw-colored or purplish-tinged, the upper long-mucronate, the lower acute; pistillate scales ovate-lanceolate, glabrous, stramineous or purplish-tinged, hypogynium 3-lobed, the lobes ovate; achene 3 mm long, shorter than the scales, not tuberculate or rugulose, ovoid, sharply trigonous, white or discolored, minutely white-pubescent.

COLOMBIA: Selva del Tui-Igarape, 200 m alt., cerca de Mitu, Vaupés, September 17, 1939, *Cuatrecasas* 6870. Type in U. S. National Herbarium, nos. 1795819, 1795820. Cerro de La Sardina, 500 m alt., bosque, Florencia, Caquetá, March 30, 1940, *Cuatrecasas* 8890.

BRAZIL: Santa Isabel, Rio Negro, Amazonas, February 15–16, 1944, *Baldwin* 3421.

This very distinctive species, a member of the section *Hymenolytrum*, is clearly distinguished from its nearest relative, *S. cyperina*, by its more robust habit, its much broader leaves, and its smooth achenes. *S. grandis* and *S. cyperina* are the only known members of the section lacking the large, conspicuous, scarious appendage to the ligule found in *S. stipularis*, *S. ramosa*, *S. violacea*, *S. macrogyne*, *S. comosa*, and *S. cyperinoides*.

[1] Contribution No. 34 from the Herbarium of West Virginia University. Received July 5, 1945.

ENTOMOLOGY.—*Six new species of beetles of a eumolpid genus new to the West Indies.*[1]

DORIS H. BLAKE. (Communicated by S. F. BLAKE.)

The genus *Alethaxius* (Coleoptera: Eumolpidae), under which I herein tentatively place six new West Indian species, was originally described by Chapuis[2] as *Aletes*, a preoccupied name later changed by Lefèvre[3] to *Alethaxius*. These West Indian species do not entirely correspond with Chapuis's description drawn up from a single species from Colombia but seem closer to four species later described by Lefèvre,[4] also from Colombia. According to Chapuis, *Aletes* (=*Alethaxius*) is closely related to *Colaspis*, but in *Aletes* the antennae are somewhat more compressed (in the West Indian group the distal joints are shorter and thicker), the eyes are more developed (in the West Indian species the eyes are very prominent), and the form of the pronotum is different (in the West Indian group the prothorax is large, the sides varying from undulate and even prominently toothed to simply arcuate and entire). Moreover, in both West Indian species and those described by Lefèvre there is a marked difference between the sexes, the females having a peculiar elytral development in the form of nodules or ridges below the humeri. In another respect some of the West Indian species resemble two species later described by Lefèvre, i.e., the femora are toothed. In Lefèvre's species the posterior femora alone are described as toothed. This character appears to be a variable one, since while the teeth are prominent on all femora in three of the West Indian species, in one they are only weakly developed and in another appear only in the posterior femora. In one species the teeth are entirely lacking. Since Lefèvre, Jacoby has contributed most of the remaining species to the genus, describing numerous Central and South American species that more or less doubtfully he has assigned to *Alethaxius*. Bowditch has added three from South America. The present group may eventually prove too distinct to be included in this genus. It appears to be common to the West Indies, occurring so far as is already known in Cuba, Puerto Rico, and Hispaniola, and is singularly constant in general characteristics. In fact, the males of a species collected on the summit of Pico Turquino in eastern Cuba are not readily distinguishable from the males of two species found in the mountains of central Dominican Republic except by their quite different genitalia. The females, on the other hand, have distinctly different elytral nodulation. The females are so unlike the males in this group that it is probable that future entomologists may describe each as specifically distinct unless the sexes are collected together.

Alethaxius hispaniolae, n. sp.

Fig. 1

Female about 4 mm long, robust, dark bronze shining with aeneous or coppery lights, legs, mouthparts, and undersurface reddish brown, basal joints of antennae pale, apices of last five joints dark; densely punctate; prothorax with undulate or obtusely toothed margin; elytra with small raised tubercles below the humeri; femora sharply toothed.

Male about 3.3 mm long, above bright shining green, elytra entirely lacking tubercles.

Head with prominent, widely separated eyes; a tumidity about base of antennal sockets; median area on vertex polished and with a slightly impressed line, from this area radiating lines of punctures producing a wrinkled effect over occiput and about eyes. Antennae extending below humeri, first two joints swollen, 3–6 slender, 7–11 thickened and with dark apices. Prothorax a third wider than long, densely punctate except in middle along the anterior margin, the punctures appearing coarser and more crowded on sides, lateral margin obtusely bitoothed, in some specimens almost undulate, an acute tooth at anterior and posterior angles, and a slight depression across the anterior part of disk over the occiput of head. Elytra in female densely and along sides

[1] Received April 30, 1945.

[2] *Genera des coléoptères* . . . 10: 250–251. 1874.

[3] *Eumolpidarum* . . . *Catalogus*. Mem. Soc. Liege, ser. 2, 11(16): 42. 1885.

[4] Mitth. Münchener Ent. Ver. 2: 124–126. 1878.

in basal half even rugosely punctate, with a group of raised warts or tubercles extending down from the humerus, gradually diminishing toward the middle, these rugosities varying in degree in various individuals. Humeri capped with an additional swelling. Punctures in basal half of elytra dense and confused, in apical half the punctures at first with a suggestion of geminate arrangement gradually straightening out into striate, single-lined punctation, finer and not so dense as in basal half. In the male the rugosities and tubercles entirely lacking and the punctation more regular. Body beneath reddish brown, finely pubescent, coxae well separated, anterior coxal cavities closed; prosternum not produced to conceal lower part of head but concave; legs with all the femora prominently and sharply toothed, punctate towards the apex; claws appendiculate. Length 3.9–4.3 mm in female: 3.3–3.4 mm in male; width 2–2.2 mm in female; 1.6 mm in male.

Type material.—Type male and 9 paratypes (7 female, 2 male), Museum of Comparative Zoology No. 27330; a pair in the U. S. National Museum, No. 57298.

Type locality.—Loma Vieja, ca. 6,000 feet altitude, south of Constanza, Dominican Republic, collected in August 1938 by P. J. Darlington, Jr.

Alethaxius darlingtoni, n. sp.

Fig. 6

Female 3–4 mm in length, elongate oblong, shining bronze with greenish luster above and with reddish brown antennae having the apices of distal joints darker, pale mouthparts, legs, and undersurface; densely punctate, prothorax with a smooth area in lower corner and with undulate margin; elytra with numerous tubercles on sides and more finely punctate toward apex; all femora with a prominent tooth.

Male 2.8–3.5 mm long, more greenish in luster, elytra without tubercles.

Head with prominent, nearly entire, widely separated eyes, interocular space more than half width of head, area about antennal sockets swollen, otherwise the front flat and broad, the central part being smoothly polished with radiating lines of punctures going up occiput and about eyes; mouthparts paler and heavy. Antennae at least half the length of body, longer in male, first two joints swollen, 3–6 slender and entirely pale, 7–11 thickened, the apices usually darker. Prothorax not twice as wide as long, with lateral margin undulate, an acute tooth at anterior and posterior angles, disk with a depression anteriorly, densely and coarsely punctate except near middle of anterior margin and near the sides at base, the punctures coarser and more crowded on sides. Elytra in female with many nodules along the sides, extending from the humeri to apical narrowing; at base punctures coarse, dense and confused; from the middle, striate, at first geminate, then in a single line to the apex and much finer. In male, no trace of tubercles, but as in female the humeri conspicuously swollen, the basal punctation coarse but not so dense as in female, and finely striate in apical half; not so costate toward apex as in other species. Body beneath deep reddish brown, legs paler, finely pubescent, all femora conspicuously toothed; tibiae grooved, first tarsal joint not much longer than second. Length of female 3.2–4.2 mm, width 1.6–1.9 mm. Length of male 2.8–3.5 mm, width 1.4–1.7 mm.

Type material.—Type male and 16 male and 17 female paratypes, Museum of Comparative Zoology No. 27331; a pair in the U. S. National Museum, No. 57299.

Type locality.—Loma Rucilla and mountains north, 5,000–8,000 feet altitude, Dominican Republic, collected in June 1938 by P. J. Darlington, Jr.

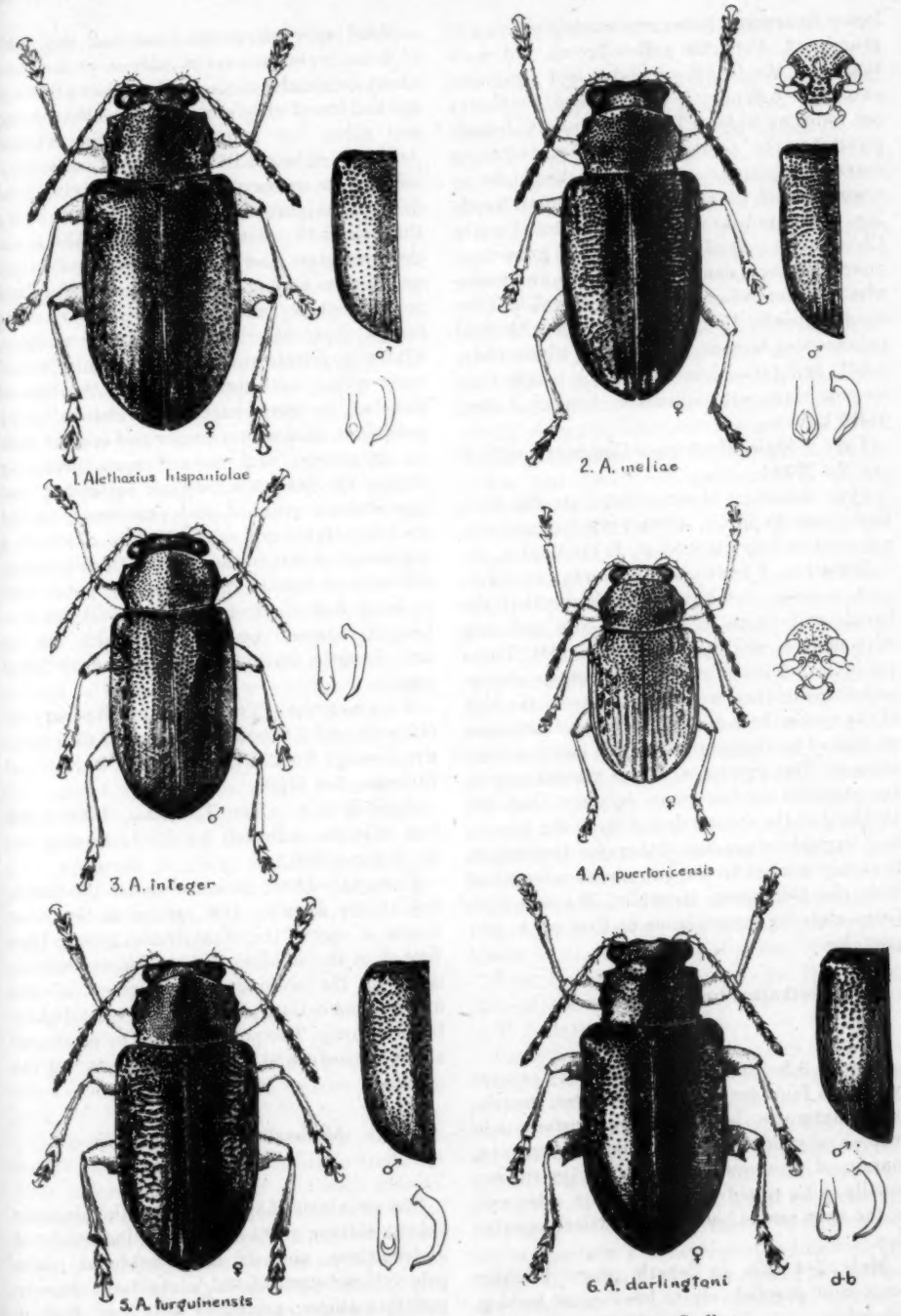
Remarks.—This species bears a close resemblance to *A. hispaniolae.* There are, however, on the elytra more nodules which extend farther down on the sides, and the prothorax has a smooth impunctate area on the sides. The male genitalia are quite unlike those of *A. hispaniolae.*

Alethaxius integer, n. sp.

Fig. 3

No females examined. Male 3 mm in length, oblong-oval, shining aeneous with pale yellow-brown antennae, legs, and undersurface, densely punctate, prothorax with rounded sides, all femora toothed.

Head with interocular space more than half width of head, polished, rather finely and not so densely punctate as in other species, a double row of punctures above the swollen areas around antennal sockets, a short median line on vertex, lower front mostly impunctate, and



FIGS. 1–6.—New species of *Alethaxius* from the West Indies.

losing its aeneous luster; eyes nearly entire and prominent. Antennae yellow-brown, not more than half the length of body, first two joints swollen, 3–6 slender, 7–11 thickened. Prothorax not twice as wide as long, moderately densely punctate, the punctures on sides becoming coarser, explanate margin not undulate or angulate with no suggestion of median toothing, but rounded, a tooth at the basal angle. Elytra more coarsely punctate than pronotum, punctures very dense in basal half and somewhat coarser below humeri, in apical half becoming striate. Body beneath paler with light pubescence; femora all toothed, tibiae channeled, first tarsal joint not much longer than second, claws appendiculate. Length 3 mm; width 1.6 mm.

Type.—Male, Museum of Comparative Zoology No. 27332.

Type locality.—Mount Diego de Ocampo, Dominican Republic, 3,000–4,000 feet altitude, collected in July 1938 by P. J. Darlington, Jr.

Remarks.—I have examined only one specimen, a male, but have little doubt that the female will prove to be larger and probably with nodules or ridges along the sides. These are indicated in the male by the coarser, denser punctures in that area. Unlike any of the rest of the species here described, the prothorax has no sign of toothing or angularity but is simply arcuate. This exception to the general rule so far observed in the genus is proof that the toothing of the thorax as well as of the femora is a variable character. Otherwise the species is closely related to the two already described from the Dominican Republic. The aedeagus bears a strong resemblance to that of *A. hispaniolae*.

Alethaxius turquinensis, n. sp.

Fig. 5

Female 3.5–4 mm in length, bronzy or coppery with faint green or purple luster, mouthparts, antennae, legs, and undersurface pale reddish or yellowish brown; densely punctate, margin of prothorax undulate, elytra rugose, usually with raised tubercles along sides and at the apex costae between the striate punctation.

Male 3–4 mm in length, more brightly aeneous or purplish, elytra less rugose, lacking tubercles.

Head with interocular space half the width of head, eyes prominent, almost entire, area about antennal sockets swollen, front otherwise flat and broad with fewer punctures than on top and sides, the punctures becoming striate. Antennae at least half the length of body, basal joints paler, apices of distal joints tending to be dark, distal joints thickened. Prothorax about a third wider than long with undulate and sometimes angulate lateral margin, usually with two undulations and an acute tooth at anterior and posterior angle; punctation fine and very dense except along anterior and posterior margins. Elytra in female rugose with irregular transverse ridges, on outer half below the humeri elevated to form warty tubercles in many specimens, punctation denser and coarser than on pronotum, and toward apex becoming striate, the intervals between somewhat costate; humeri polished and prominent; in the male the elytra not so rugose but still with a suggestion of transverse ridging. Body beneath yellowish or reddish brown, lightly pubescent, a small but distinct tooth on all femora. Length, female, 3.6–4.3 mm; width 1.8–2.1 mm. Length, male, 2.9–4.1 mm; width 1.6–2 mm.

Type material.—Type male and 19 paratypes (12 male and 7 female), Museum of Comparative Zoology No. 27333; a pair in U. S. National Museum, No. 57300.

Type locality.—Pico Turquino, 5,000–6,000 feet altitude, collected by P. J. Darlington, Jr., in June 1936.

Remarks.—If we do not consider the tubercles in the females, this species is the most rugose of any of the West Indian group; likewise it is the dullest, the specimens showing little of the shining aeneous-green of the others, even in the males which are only slightly more lustrous. The punctures on the prothorax are the densest and finest found in any of the species.

Alethaxius meliae, n. sp.

Fig. 2

Female about 3.5 mm in length, elongate oblong, shining green or coppery, legs, some of undersurface, and six basal antennal joints pale yellow-brown, distal joints dark; densely punctate above; prothorax with two distinct median teeth on margin; elytra with a short

ridging or nodules below humeri and swollen costae at apex. Hind femora weakly toothed.

Male 3–3.5 mm in length, lacking ridges or nodules below humeri, the apical costation not so developed.

Head with prominent, widely separated eyes, interocular space a little more than half the width of head, eyes very little emarginate; area about antennal sockets swollen, otherwise the front flat, a short median line on vertex, this median space less punctate than about eyes and on occiput, the punctation becoming somewhat striate about eyes. Mouthparts pale brownish. Antennae at least half length of body in male, shorter in female; distal joints thickened and dark. Prothorax a third or less wider than long, densely punctate, the punctures on the sides becoming coarser, a little depression below anterior margin; sides with two acute teeth between the acute tooth on anterior and posterior angles. Elytra densely punctate in basal half, and finer and less densely in apical half, towards apex becoming striate with the interstices costate at apex, particularly swollen at the tip in the female and forming an apical tumidity; in the single female specimen examined a broken ridge or series of nodules running down below the humerus a short distance, this nodulation entirely lacking in male. Body beneath reddish or yellowish brown, with the sides of the prosternum and metasternum aeneous, the latter punctate; legs pale with punctures on femora becoming coarser and more apparent at apex; a distinct tooth on posterior femora; tibiae grooved. Length, female 3.6 mm; width 1.7 mm; length, male 3–3.5 mm; width 1.3–1.4 mm.

Type material.—Type male and 11 male and 1 female paratypes, U. S. National Museum No. 57301; 2 male paratypes in Museum of Comparative Zoology.

Type locality.—Villalba, Puerto Rico, collected on *Melia* sp. by R. G. Oakley, June 18, 1934.

Remarks.—This is the slenderest and the most densely punctate of the group from the West Indies. It is the only one with sharply produced teeth on the prothorax. The single female examined had only a short broken ridge or tubercles, not very conspicuous, on the elytra. Only the posterior femora are toothed. It is the most golden-green of the species here described and very lustrous.

Alethaxius puertoricensis, n. sp.
Fig. 4

Female between 2.5–3 mm in length, oval, shining, yellow-brown, the distal joints of antennae and undersurface deep reddish brown; densely and coarsely punctate, the punctures of the elytra more or less striate, the interstices being somewhat costate, and on the sides several rows of warty elevations along costae, the humeri unusually prominent; thorax acutely angulate; femora not toothed.

Male unknown.

Head polished with numerous but not dense punctures, a line of them slightly above antennal sockets; interantennal area smooth, broad; front with a faint median vertical line; eyes widely separate, interocular space half width of head. Antennae reaching the middle of the elytra, first two joints swollen, 3–6 slender, 7–11 thickened and with darkened apices. Prothorax not twice as broad as long, depressed below the middle, margin with almost toothed angles near the middle, and a distinct basal tooth; disk densely and coarsely punctate. Elytra tending to be costate between the rows of punctures, the punctures at base somewhat confused, possibly geminate, becoming single striae at middle, on the sides the costae becoming warty, 4 or 5 rows of warts, and an enlarged hump on the humerus. Body beneath deep reddish brown, shining, lightly pubescent. Legs paler, femora not toothed, tibiae grooved on one side; first tarsal joint not much longer than second, claws appendiculate. Length 2.6–2.9 mm.; width 1.4 mm.

Type material.—Type female, Museum of Comparative Zoology No. 27334; 1 paratype, a female, in U. S. National Museum, No. 57302.

Type locality.—El Yunque, ca. 3,000 feet altitude, Puerto Rico, collected in May 1938 by P. J. Darlington, Jr.

Remarks.—This species is unlike the others described in this paper in coloration, being simply yellow-brown without any metallic luster, in being much smaller in size, and in lacking altogether any toothing of the femora. The general aspect of the head is unlike the rest. There are no swollen areas about the antennal sockets; the front of the face is smoother and not so punctate. Furthermore, the antennae are longer. In the pattern of its elytral punctation and wartiness it is very similar to the rest. Unfortunately, no male has been examined.

ENTOMOLOGY.—*A new larvaevorid parasite of the social butterfly* Eucheira socialis *Westwood (Diptera).*[1] MAURICE T. JAMES, U. S. Bureau of Entomology and Plant Quarantine.

The larvaevorid described in this paper was submitted to me for identification by A. C. Baker, of the Mexico City laboratory of the Bureau of Entomology and Plant Quarantine. Being unable to place it as to genus, I requested that specimens be sent to H. J. Reinhard, of the Texas Agricultural Experiment Station, who, in turn, referred one of them to A. R. Brooks of the Department of Agriculture of Canada. Neither of these workers could do more than to place it in the Ernestiini, near *Mesembrierigone* Townsend, the genus to which it traces in Townsend's keys.[2] Since a name is desired for a report of its host relationships, I am referring it to a new genus and species of Ernestiini.

Eucheirophaga, n. gen.

Head slightly wider than high, its length at base of antennae approximately equal to that at oral margin and about three-fifths head height. Front flat in lateral profile, equal to face in length; vertex one-sixth head width in male, almost one-quarter in female. Face in lateral profile concave, the epistoma being rather strongly though gradually warped forward; clypeus transversely convex, its sides but slightly sunken, its middle distinctly elevated over facials; no facial carina; epistoma transversely convex, fully as broad and half as long as clypeus. Parafacials bare; each facial with several bristles and a few short hairs near vibrissa, otherwise bare. Cheek about one-half to three-fifths eye height. Eyes thickly and uniformly long-pilose. Antenna reaching to upper margin of epistoma; first segment short, porrect; second moderately long; third 1½ length of second and rather broad; arista bare, its first two segments each twice as long as thick, its third segment thickened on basal half, thence tapering to a sharp point. Palpi well developed, clavate, reaching to or beyond epistoma; proboscis short, labella fleshy. Outer verticals well differentiated in female, poorly so or not at all in male; inner verticals strong, cruciate; postverticals small; ocellars small, weaker than frontals, proclinate; frontals strong, extending 3 to 5 on each side below antennal base but not extending below base of arista; frontoorbitals 2 strong proclinate and 2 strong reclinate in female, none in male; gnathoorbitals 3 to 4 on each side.

Transverse suture distinct, dividing mesonotum into two approximately equal parts. Prosternum fine-haired laterally; propleura bare; no infrasquamal setulae. Acrosticals 3–3, hind presutural pair very close to suture; dorsocentrals 3–3; intraalars 1–3; supraalars 1–3; sternopleurals 3, almost in a row; pteropleural 1, strong, reaching practically to apex of squama; lateroscutellars 3, strong; no apicoscutellar; discoscutellars 1 strong pair and 2 or 3 weaker pairs. Legs not elongated; tarsi subequal in length to tibiae. Wings slender, rather pointed, especially in male; apical cell open and ending a distance equal to length of r-m before wing tip; cubitulus rectangular, with a very short stump; last section of vein Cu_1 about one-fifth previous section; veins R_1 and Cu_1 bare; vein R_4 with about 3 to 5 setulae at its base. Squamae bare above.

Abdomen ovate, nearly as deep as wide, with four pregenital segments; genitalia apicoventral, not concealed in a slit. Marginals lacking on segment 1; a strong median pair, extended laterally into a weak row, on segment 2; strong marginal rows each on segments 3 and 4; segments 2 to 4 each with 2 median discal pairs arranged one in front of the other, and with several unpaired weaker bristles or strong bristlelike setulae at each side of the median series; on segment 4, because of the narrowness of the segment, these bristles may appear to be arranged in rather a haphazard fashion. Sternates of pregenital segments almost wholly concealed.

Genotype, *Eucheirophaga lugubris*, n. sp.

In Curran's key,[3] *Eucheirophaga* will trace to *Hineomyia* Townsend, couplet 208 (p. 444), but in that genus, among other differences, the

[1] Received June 20, 1945.

[2] TOWNSEND, C. H. T., *Manual of myiology*, pt. 3: 8–15, 20–27, 205–206, 1936, Itaquaquecetuba, São Paulo, Brazil. In order to make this genus (and *Mesembrierigone* as well) run through the tribal key, pp. 20–27, the word "or" must be inserted between the two parts of the second alternative of couplet 4.

[3] CURRAN, C. H. *The families and genera of North American Diptera*, 512 pp. New York, 1934.

face is distinctly receding, the epistoma is short, the third antennal segment is sharply truncated apically, only two presutural acrosticals, the hind one remote from the suture, are present, vein M_2 is continued far beyond the cubitulus, and the sternites (at least in the female) are broadly exposed and bristled. The closest relationship of *Eucheirophaga* to any known genus is probably to *Mesembrierigone*, but in that genus, among other differences, the basal two aristal segments are each but little longer than wide, the third antennal segment is twice as long as the second, the ocellars are strong, cruciate apicoscutellars are present, the second and third abdominal segments have each but one pair of median discals, and the cubitulus is bent to an acute angle without a stump.

Eucheirophaga lugubris, n. sp.

Male.—Predominantly black and black-haired, with a yellow face and with cinereous-pollinose areas on the abdomen. Relative head measurements in micrometer units (from holotype): Head width, 65; head height, 62; vertex, 11; length of head at base of antenna, 36, at oral margin, 35; length of front, 37, of face, 37; cheek width, 20; eye height, 40; minimum width of parafacial, 8; maximum width of facial, 6; width of epistoma at vibrissa, 16; maximum width of clypeus, 17; length of first, second, and third antennal segments and arista, 3, 11, 16, 24, respectively. Corneous part of haustellum about one-third head height.

Frontalia brown; parafrontals and occiput black; face yellow; antenna black, extreme apex of second and base of third segment reddish; arista blackish, tending to become brownish on the thickened part; proboscis brown; palpi black. Head covered with yellowish pollen, thickly so on lower parts of occiput and face, thinly so on parafrontals. Pile of occiput and lower parts of cheeks bushy yellow; that of eyes yellow; that of head otherwise black. Thorax and legs, including all hairs and bristles, black; mesonotum lightly cinereous-pollinose, with four longitudinal vittae of brownish pollen; scutellum with brownish pollen which becomes cinereous apically. Pleura with scant cinereous pollen. Squamae infuscated. Wings grayish subhyaline, the veins except on the apex and posterior third of the wing broadly bordered with fuscous, the clouding tending to run together so that a large part of the anterior basal half or more of the wing is infuscated. Abdomen, including its hairs and bristles, black; dorsal surface of tergites thinly brownish-pollinose with a prominent transverse lateral cinereous marking on each side of the second, third, and fourth segments, these markings appearing conspicuous from a posterior view; sides and ventral surface of fourth segment largely cinereous-pollinose.

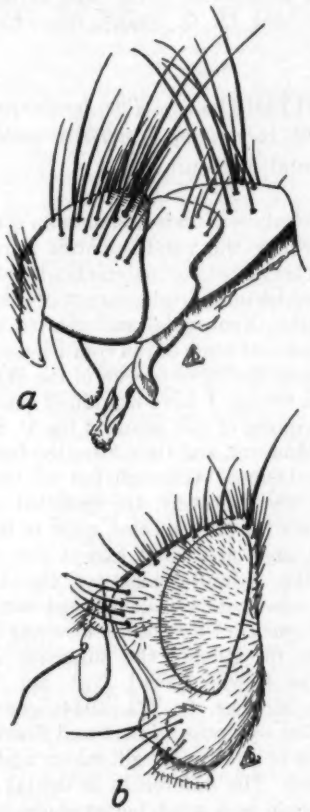


FIG. 1.—*Eucheirophaga lugubris*, n. sp., male: *a*, Genitalia; *b*, side view of head. Drawings by Arthur Cushman.

Genitalia blackish dorsally, becoming reddish ventrally. Anal forceps united, beaklike, rather small, broad basally and tapering to a blunt point; outer clasper twice as long as wide, parallel-sided for most of its length, the apical margin oblique and ending in an angle of about

60°; inner clasper slender, bladelike, arcuate with a small hook at the apex; penis simple, tubular.

Female.—Differs in sexual characters and in those indicated in the generic description.

Holotype.—Male, U.S.N.M. no. 57286, 63 km from Mexico City in the State of Morelos, January 1944 (J. G. Shaw), from *Eucheira socialis* Westwood, on *Arbutus* sp., Shaw no. 5047.

Described also from the allotype, female, and paratypes, 1 male and 1 female, same data, and from a series of specimens, mostly in poor condition, only 1 male and 1 female being considered paratypes, from Morelos, Mexico, February 1944 (J. G. Shaw), from *Eucheira socialis* on *Arbutus* sp., Shaw no. 5049.

ICHTHYOLOGY.—*The leatherjackets, carangid fishes of the genus* Oligoplites *Gill, inhabiting American waters.*[1]

LEONARD P. SCHULTZ, United States National Museum.

This study was undertaken in an attempt to determine the valid scientific name for the leatherjacket, or palometa, inhabiting the brackish and fresh waters of Lago de Maracaibo, Venezuela, and also to try to straighten out some of the confusion centering around the other species of the Western Atlantic Ocean. I have examined nearly all the specimens of this genus in the U. S. National Museum, and they form the basis for my conclusions. Although not all the records in the literature are included in the synonymy for each species, most of the important ones are listed except for *saurus* along the Atlantic coast of the United States, where it is not confused with any related species. I do not see how one is justified in recognizing the subgenus *Leptooligoplites* Fowler (Acad. Nat. Sci. Philadelphia Monogr. 6: 223. 1944; genotype, *Oligoplites refulgens* Gilbert and Starks) on the basis of a few more gill rakers and elongate form. The differences in dental structures would be a much better characteristic on which to establish subgenera if such were needed, but I do not think it necessary in this otherwise distinct group.

Dr. T. Gill (Proc. Acad. Nat. Sci. Philadelphia, 1863: 166) proposed the genus *Oligoplites* with *Oligoplites inornatus* Gill as genotype, thus separating the Eastern Atlantic and African species with a few more dorsal spines from related species in American waters. The genus is easily recognized by the "mackerel form" of the compressed body; the two free anal spines at the front of the anal fin; lunate-shaped caudal fin; long anal and dorsal fin with all of the soft rays connected by membrane so that no free finlets occur; skin without external scales, although covered with fine ridges, representing minute embedded scales that extend at slightly different angles; lateral line unarmed, running along the middle or lengthwise axis of the body, and a little arched over the pectoral fin; dorsal profile anteriorly with a low keel; head short, compressed, somewhat pointed; the greatest depth of body near origin of second dorsal; mouth oblique, large, the lower jaw projecting slightly; premaxillaries not protractile, the premaxillary groove not continuous across tip of snout; maxillary narrow, long, reaching to under rear of orbit or past it, without supplemental bone; teeth present on premaxillaries, vomer, palatines, dentary and tongue; those on dentary in the young and half grown with an outer row that flares outward, curving dorsally so that the band of teeth in the upper jaw fits into the trough made by these numerous curved teeth, but these appear to be lost so that the adult has a row of much less closely spaced teeth that are less curved and coarser; gill rakers long; dorsal spines usually IV or V, rarely III or VI, connected at base by a low membrane; anterior rays of soft dorsal and anal fins somewhat elevated anteriorly, but with deep notches between the rays posteriorly; pectoral fins short; gill membranes extending far forward with a small delicate membrane connecting across the isthmus anteriorly; pelvics fitting into a groove, in-

[1] Published by permission of the Secretary of the Smithsonian Institution. Received July 16, 1945.

serted under the pectoral fin bases.

Numerous counts were made on the various species studied and these are recorded in Table 1.

KEY TO THE SPECIES OF OLIGOPLITES

1*a*. Number of gill rakers, including rudiments, on first gill arch, 5 to 7+1+16 to 21; dorsal surface of head without a network of tubes opening through numerous pores on surface of skin; mucous pores however, appear to develop more numerously on adults with increase in size.

2*a*. Premaxillary with a single row of short conical teeth along its entire length, except in young about 85 mm and shorter this row irregular or nearly in 2 rows anteriorly at front of snout; toothed portion of vomer a patch, usually a trifle longer than wide and somewhat bluntly pointed posteriorly; teeth on dentary in 2 distinct rows; dorsal rays IV–I, 20 or 21; depth 3 to 3.4; head 1.3 in young, 1.4 to 1.6 in adults; posterior margin of maxillary more or less truncate; Central America and West Indies to Montevideo, Uruguay..... *Oligoplites saliens* (Bloch)

2*b*. Premaxillary teeth (65 mm in standard length and shorter) in 1 or 2 rows posteriorly, becoming a narrow band anteriorly; toothed portion of vomer much longer than wide, with a short, somewhat pointed, posterior projection; teeth on dentary in 2 rows; dorsal rays usually V-I, 19 to 21, rarely IV spines; depth 3.9 to 4.6; head 0.85 to 1.0; posterior part of maxillary angularly rounded; Pacific Ocean from Panama Bay to Guayaquil, Ecuador.

Oligoplites refulgens Gilbert and Starks

1*b*. Number of gill rakers, including rudiments, on first gill arch 3 to 6+1+10 to 15.

3*a*. Dorsal surface of head without an underlying network of tubes, opening to surface through numerous pores.

4*a*. Premaxillary with a band of villiform teeth along its entire length, posteriorly narrow, but anteriorly wide, consisting of several rows; toothed portion of vomer usually a little longer than wide, more or less pointed posteriorly; teeth on dentary becoming a band anteriorly; dorsal rays IV-I, 19 to 21, rarely V free spines; depth 3.4 to 3.8; head in greatest depth 1.2 to 1.4; posterior tip of maxillary rounded, reaching past orbits in adults; Nicaragua to Rio de Janeiro, Brazil, in Lake Yzabal, Guatemala, and in Lake Maracaibo, Venezuela.

Oligoplites palometa (Cuvier and Valenciennes)

4*b*. Premaxillary teeth essentially in 2 distinct rows along its entire length except far posteriorly where it may become an irregular row, and far anteriorly near tip of snout where a minute row of teeth may occur between the two distinct rows; toothed portions of vomer on half-grown and adults much longer than wide, posterior projection more or less tapering to a point behind; teeth on dentary in 2 rows; dorsal rays V-I, 18 to 21, rarely IV or VI free spines; depth 3.4 to 4.1; head in greatest depth 1.0 to 1.6; posterior edge of maxillary rounded, usually not reaching past orbit.

5*a*. Premaxillary with 2 distinct rows of teeth, seldom with a few minute ones between them far anteriorly; gill rakers on lower limb of first arch usually 13 or 14 (11 to 14), counting rudiments; Woods Hole, Mass., southward in Gulf of Mexico and West Indies to Montevideo, Uruguay.

Oligoplites saurus saurus (Bloch)

5*b*. Premaxillary with 2 distinct rows of teeth and usually with some minute teeth between them anteriorly; gill rakers on lower limb of first arch usually 14 or 15 (13 to 16), counting rudiments; southern California and Gulf of California to Bay of Sta. Elena, Ecuador.

Oligoplites saurus inornatus Gill

3*b*. Dorsal surface of head with a network of tubes in skin opening to surface through numerous pores, these best developed in adults, scarcely so in young; premaxillary with a band of teeth, wider anteriorly, outer and inner rows a little enlarged; dentary with some teeth anteriorly between two outer rows; gill rakers 3 to 5+1+10 to 12; anal rays II-I, 19 to 21; greatest depth 2.7 to 3.2 in standard length.

6*a*. Tip of snout to rear edge of maxillary 1.7 to 1.8 in head, the latter 4.2 to 4.3 in standard length; length of pectoral fin a little longer than length of maxillaries; Panama to Guayaquil, Ecuador . . . *Oligoplites altus* (Günther)

6*b*. Tip of snout to rear edge of maxillary 1.4 to 1.6 in head, the latter 3.7 to 4.0 in standard length; pectoral fin a little shorter than length of maxillaries; Gulf of California to Callao, Peru.

Oligoplites mundus Jordan and Starks

Oligoplites saliens (Bloch)

Scomber saliens Bloch, Ichthyologie, Histoire naturelle des poissons **10**: 41, pl. 335. 1792 (Antilles).—Cuvier and Valenciennes, Histoire

TABLE 1.—COUNTS MADE ON VARIOUS SPECIES OF OLIGOPLITES

Species and localities	Dorsal rays						Anal rays			Number of gill rakers on first gill arch																
										Above angle			At angle	Below angle												
	IV	V	VI	I, 18	I, 19	I, 20	I, 21	II–I, 19	II–I, 20	II–I, 21	3	4	5	6	7	1	10	11	12	13	14	15	16	17	18	19	20	21
saliens:																											
Central America and Gulf of																											
Venezuela	3	—	—	—	—	2	1	—	—	3	—	—	2	2	—	4	—	—	—	—	—	1	1	1	1	—	—
Trinidad	1	—	—	—	—	1	—	—	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	—	—	—
Brasil	3	—	—	—	—	3	—	—	2	1	—	—	—	3	—	3	—	—	—	—	—	—	—	3	—	—	—
refulgens:																											
Panama	1	10	—	—	2	6	3	4	3	1	—	—	3	4	2	9	—	—	—	—	—	—	1	3	4	2	1
palometa:																											
Central America and Gulf of																											
Venezuela	5	—	—	—	2	3	—	—	4	1	—	2	2	1	—	5	—	—	3	2	—	—	—	—	—	—	—
Lake Maracaibo	8	—	—	—	—	5	3	—	5	3	—	—	6	2	—	8	—	—	2	6	—	—	—	—	—	—	—
Trinidad	—	1	—	—	—	1	—	—	—	—	—	—	1	—	—	1	—	—	—	1	—	—	—	—	—	—	—
Brasil	4	—	—	—	—	3	1	1	2	—	—	—	2	—	—	2	—	—	2	—	—	—	—	—	—	—	—
mundus:																											
Mexico	2	1	—	—	1	1	1	—	2	1	—	—	3	—	—	3	—	1	2	—	—	—	—	—	—	—	—
Panama	4	1	—	1	4	—	—	2	—	—	—	1	2	—	—	4	—	1	2	—	—	—	—	—	—	—	—
Ecuador	3	2	—	2	3	—	—	4	—	—	—	—	4	—	—	4	—	1	2	—	—	—	—	—	—	—	—
altus:																											
Panama	—	2	—	—	1	1	—	—	2	—	1	—	1	—	—	2	—	1	1	—	—	—	—	—	—	—	—
saurus saurus:																											
Massachusetts to New Jersey	—	7	—	—	4	2	—	3	2	1	—	1	2	—	—	3	—	1	—	2	—	—	—	—	—	—	—
Florida	—	14	1	—	2	11	2	2	9	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Texas	—	5	—	—	2	3	—	2	2	—	—	—	1	—	—	1	—	—	—	—	1	—	—	—	—	—	—
Cuba	1	6	—	1	1	5	2	2	4	—	—	—	—	2	—	2	—	—	1	1	1	—	—	—	—	—	—
Puerto Rico	—	2	—	—	—	2	—	—	2	—	—	—	5	—	—	5	—	—	4	1	—	—	—	—	—	—	—
Jamaica	—	2	—	—	—	2	—	—	2	—	—	—	1	1	—	2	—	—	2	—	—	—	—	—	—	—	—
Panama and Colombia	1	9	—	—	2	7	1	—	5	—	—	—	5	—	—	5	—	—	3	3	—	—	—	—	—	—	—
Gulf of Venezuela	—	5	—	—	—	4	1	—	4	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
saurus tnornatus:																											
Southern California	—	3	—	—	—	—	—	—	—	—	—	1	2	—	—	3	—	—	—	2	1	—	—	—	—	—	—
Mexico	—	11	—	—	5	5	1	7	4	—	—	—	5	7	—	12	—	—	—	—	7	5	—	—	—	—	—
Central America	—	11	—	—	1	7	3	1	4	4	—	—	5	8	1	14	—	—	—	—	4	9	1	—	—	—	—

naturelle des poissons **8**: 389. 1831 (Martinique; Cayenne; Brazil).

Scombroides saliens Regan, Proc. Zool. Soc. London, 1903, **2**: 66 (Rio de Janeiro).

Scomberoides saltator Lacepède, Histoire naturelle des poissons **2**: pl. 19 (opposite p. 596) upper fig., 1800; *text*, **3**: 55. 1802.

Chorinemus saliens (var. *saliens*) Günther, Catalogue of the fishes in the British Museum **2**: 475. 1860.

Oligoplites saliens Jordan and Evermann, U. S. Nat. Mus. Bull. 47: 899. 1896 (West Indies).—Fowler, Proc. Acad. Nat. Sci. Philadelphia, 1905: 60, fig. 2 (Rio de Janeiro).—Starks, The fishes of the Stanford Expedition to Brazil: 43. 1913 (Pará).—Fowler, Proc. Acad. Nat. Sci. Philadelphia, 1915: 532 (Trinidad); 1919: 129 (Rio de Janeiro).—Ribeiro, Arch. Mus. Nac. Rio de Janeiro **17**: (Carang.) 8. 1915 (Antilles to Rio de Janeiro; Bahía).—Meek and Hildebrand, Marine fishes of Panama, pt. 2: 390. 1925 (West Indies and Brazil).—Jordan, Evermann, and Clark, Rept. U. S. Comm. Fish. 1928, pt. 2: 277. 1930 (West Indies).—Devincenzi, Ann. Mus. Hist. Nat. Montevideo **4** (13): 24, fig. 9. 1939 (Rio de la Plata; Punta Gorda, Montevideo).—Devincenzi and Legrand, Ann. Mus. Hist. Nat. Montevideo, 1940: pl. 5, fig. 2.—Fowler, Proc. Amer. Philos. Soc. **82** (5): 764. 1940 (Rio de Janeiro); Arq. Zool. Est. São Paulo **3**(6): 152. 1941 (Pará, Brazil).

Bloch's description of *saliens* indicates that his specimen had a single row of teeth in the upper jaw (also shown in his figure 335) along with four spines in the first dorsal. On the basis of these two characters I am referring specimens with such a combination of characters to *Oligoplites saliens* (Bloch). In addition, the gill rakers on the lower limb of the first arch of this species are more numerous than on the other species of *Oligoplites* from the Western Atlantic Ocean. They are 16 to 20 instead of 12 to 14.

This is one of the most distinctive species among all those in the genus and can be identified at once by the single row of conical teeth along the premaxillary. The maxillaries in the adults extend past the orbit and form an angle of 40° with the longitudinal axis of the body. The dorsal part of the body is darkish in preserved specimens.

The material examined consists of 7 specimens, all from U. S. National Museum collections, as follows: no. 44701, 1 specimen from the Atlantic coast of Central America; nos. 123073 to 123075, 3 specimens from Gulf of Venezuela; nos. 100824 and 100825, 2 specimens from Porto Inhauma, Brazil; no. 76330, 1 specimen from Rio de Janeiro.

This Atlantic species ranges from Central America, Gulf of Venezuela, and the West Indies southward to Montevideo, Uruguay.

Oligoplites refulgens Gilbert and Starks

Oligoplites refulgens Gilbert and Starks, Mem. California Acad. Sci. **4**: 73, pl. 11, fig. 19. 1904 (Panama Bay).—Meek and Hildebrand, The marine fishes of Panama, pt. 2; 392, pl. 39, fig. 2. 1925 (Pacific coast of Panama to Guayaquil).—Jordan, Evermann, and Clark, Rept. U. S. Comm. Fish. 1928, pt. 2: 278. 1930 (Panama).—Fowler, Acad. Nat. Sci. Philadelphia Monogr. 6: 223, fig. 156. 1944 (Playa Muerto, Panama).

Leptooligoplites Fowler, Acad. Nat. Sci. Philadelphia Monogr. 6: 223, fig. 156. 1944. (Genotype —*Oligoplites refulgens* Gilbert and Starks.)

This species may be recognized by its more slender body and numerous gill rakers on the lower limb of the first arch, 17 to 21 instead of 15 or fewer in the other Pacific species. The maxillaries form an angle of about 32° with the longitudinal axis of the body. I have examined large series of specimens, 75 mm and shorter, from Chame Point, Panama, in U.S.N.M. nos. 81986, 82024, and 82025; also 3 small specimens in U.S.N.M. no. 101745, and 1 specimen, U.S.N.M. no. 101744, both from Colombia.

This Pacific species ranges from Panama Bay to Guayaquil, Ecuador.

Oligoplites palometa (Cuvier and Valenciennes)

Chorinemus palometa Cuvier and Valenciennes, Histoire naturelle des poissons **8**: 392. 1831 (Lake Maracaibo).

? Chorinemus guaribira Cuvier and Valenciennes, Histoire naturelle des poissons **8**: 393. 1831 (Brazil).—Günther, Catalogue of the fishes in the British Museum **2**: 475. 1860 (coast of Brazil).

Chorinemus saliens (var. *palometa*) Günther, Catalogue of the fishes in the British Museum **2**: 475. 1860 (Lake Maracaibo).

Oligoplites saliens palometa Jordan and Evermann, U. S. Nat. Mus. Bull. 47: 899. 1896 (Lake Maracaibo, Venezuela).—? Gilbert, Proc. Washington Acad. Sci. **2**: 166. 1900 (Maceio, Brazil).

Oligoplites palometa Jordan, Evermann, and Clark, Rept. U. S. Comm. Fish. 1928, pt. 2: 278. 1930 (Lake Maracaibo).

Scombroides palometa Regan, Proc. Zool. Soc. London, 1903, **2**: 66 (Lake Yzabal); Biologia

Centrali-Americana, Pisces: 15. 1908 (Guatemala, Lake Yzabal; Lago de Maracaibo).
Oligoplites saurus Fowler, Proc. Amer. Philos. Soc. **82**(5): 764. 1940 (? Rio de Janeiro).

This species is the only one known from the Western Atlantic that has a wide band of villiform teeth on each premaxillary. From *O. saurus saurus* of the Atlantic it differs in having IV spines in the first dorsal instead of V. The maxillaries form an angle of about 40° with the longitudinal axis of the body. The dorsal part of its back is blackish. The anterior portion of the second dorsal fin is blackish and the proximal portion of the anterior soft rays of the anal are blackish. The tips of the rays of the caudal fin are tinged with blackish pigment so as to form a narrow darkish posterior border.

This study was based on U.S.N.M. no. 44205 and nos. 44373 to 44375, 6 specimens from Nicaragua; U.S.N.M. no. 123083, 1 specimen from the Atlantic side of Central America; another small specimen, U.S.N.M. no. 83796, from Trinidad; and 1 specimen each for U.S.N.M. nos. 100817, 100847, and 100851, all from Brazil. Also U.S.N.M. no. 83130, without locality, was collected by the Wilkes Exploring Expedition; 8 specimens from Lago Maracaibo, U.S.N.M. nos. 121803 to 121806, collected by me in 1942, and U.S.N.M. no. 123072, 1 specimen from the Gulf of Venezuela.

This Atlantic species ranges from Nicaragua and Lake Yzabal, Guatemala, and Lake Maracaibo, Venezuela, southward to Rio de Janeiro, Brazil.

Oligoplites saurus saurus (Bloch and Schneider)

Scomber saurus Bloch and Schneider, Systema ichthyologiae: 32. 1801 (Jamaica).
? Centronotus argenteus Lacepède, Histoire naturelle des poissons **3**: 316. 1802 (Equatorial America).
? Lichia quiebra Quoy and Gaimard, *in* Freycinet, Voyage . . . *Uranie* and *Physicienne*, Zool.: 365. 1824 (Equatorial America) (ref. copied).
Chorinemus saltans Cuvier and Valenciennes, Histoire naturelle des poissons **8**: 393. 1831 (Martinique).
Chorinemus quiebra Cuvier and Valenciennes, Histoire naturelle des poissons **8**: 396. 1831 (Brazil; Martinique; Havana).
Chorinemus occidentalis Günther (not of Linnaeus, as *Gasterosteus occidentalis* Linnaeus is not an *Oligoplites*), Catalogue of the fishes in the British Museum **3**: 475. 1860 (Jamaica; San Domingo; Trinidad; Puerto Cabello; Bahía).
Oligoplites occidentalis Goode and Bean, Proc. U. S. Nat. Mus. **5**: 237. 1882 (Gulf of Mexico). —Jordan and Gilbert, Proc. U. S. Nat. Mus. **5**: 270. 1882 (Pensacola, Fla.).
Scombroides occidentalis (in part) Jordan and Gilbert, U. S. Nat. Mus. Bull. 16: 447, 913, 973. 1882 (Central America, West Indies to New York). (On p. 973 the name is corrected to *O. saurus*.)
Oligoplites rathbuni Ribeiro, Arch. Mus. Nac. Rio de Janeiro **17**: (Carang.) 8. 1915 (Bahía).—Fowler, Arq. Zool. Est. São Paulo **3**(6): 152. 1941 (Bahía).
Oligoplites saurus Berg. Ann. Mus. Nac. Buenos Aires **4**: 38, 1895 (Montevideo).—(in part) Jordan and Evermann, U. S. Nat. Mus. Bull. 47: 898, pl. 138, fig. 378, 1896. 1900 (Tropical America; New York to Florida; West Indies). —Evermann and Marsh, Bull. U. S. Fish Comm. **20**, pt. 1: 127, pl. 7. 1902 (Puerto Rico).—(in part) Gilbert and Starks, Mem. California Acad. Sci. **4**: 70. 1904 (Florida; Jamaica).—Fowler, Proc. Acad. Nat. Sci. Philadelphia, 1905: 59 (Fort Macon, N. C.; Key West, Fla.).—Jordan and Thompson, Bull. U. S. Bur. Fish. **24**: 237. 1905 (Garden Key, Fla.).—Smith, The fishes of North Carolina: 200, fig. 81. 1907 (Beaufort, N. C.).—Starks, The fishes of the Stanford Expedition to Brazil: 43. 1913 (Natal).—Ribeiro, Arch. Mus. Nac. Rio de Janeiro **17**: (Carang.) 7. 1915 (Tropical Pacific and Atlantic from New York to Rio de Janeiro; Bahía).—Fowler, Proc. Acad. Nat. Sci. Philadelphia, 1915: 532 (Trinidad); 1919: 147 (Jamaica).—Devincenzi, Ann. Mus. Nac. Montevideo, ser. 2, pt. 5: 217. 1924 (Montevideo).—(in part) Meek and Hildebrand, The marine fishes of Panama, pt. 2: 390, pl. 39, fig. 1. 1925 (Tropical America).—Devincenzi and Barattini, Ann. Mus. Hist. Nat. Montevideo **2**: pl. 24, fig. 1, 1928.—Beebe and TeeVan, Zoologica **10**(1): 112, fig., 1928 (Port-au-Prince Bay). —Hildebrand and Schroeder, Bull. U. S. Bur. Fish. **43**: 219, fig. 128. 1928 (Lynnhaven Roads, Va.)—(in part) Jordan, Evermann, and Clark, Rept. U. S. Comm. Fish. 1928, pt. 2: 277, 1930 (Central America, West Indies to New York).—Nichols, Sci. Surv., Puerto Rico and Virgin Islands, New York Acad. Sci., **10**(2): 232, fig. 86. 1929 (Puerto Rico).—Fowler, Proc. Acad. Nat. Sci. Philadelphia, 1931: 398 (Trinidad).—Hubbs, Carnegie Inst. Washington Publ. 457: 253. 1936 (Champoton, Campeche; mouth Río Champoton).—Fowler, Proc. Acad. Nat. Sci. Philadelphia, 1937: 310 (Haiti).—Carvalho and Ramos, Bol. Ind. Animal Brazil **4**: 24. 1941 (Rio Ribeira de Iguape).—Longley and Hildebrand, Carnegie Inst. Washington Publ.: 535: 83. 1941 (Tortugas).—Carvalho, Bol. Ind. Anim. São Paulo **4** (3, 4): 53. 1941 (Brazil; Uruguay). —Fowler, Arq. Zool. Est. São Paulo **3**(6): 153. 1941 (Bahía).—Röhl, Fauna descriptiva de

Venezuela: 399, fig. 213. 1942 (coast of Venezuela).

My observations and comparisons of specimens from both the Atlantic and Pacific sides of Central America indicate that the two populations are slightly different structurally but perhaps no more so than those populations along the coasts from Massachusetts to Rhode Island as compared with that in the Gulf of Mexico to Venezuela. By reference to Table 1 it may be noted that a decrease in the number of gill rakers appears to occur northward on both coasts. However, the series are so small that these differences may disappear when several hundred more counts are made. The only other difference observed by me was the more fully developed middle row of minute teeth in those specimens from the Pacific waters. Other differences may be observed when an extensive statistical study is made but I am unable to devote that much time to this problem at present. Tentatively, I am recognizing them as subspecifically different, but not on very good and substantial facts.

The following material, all in the U. S. National Museum, has been examined by me: no. 16354, 1 specimen from Woods Hole, Mass.; no. 14015, 1 specimen from Long Island, N. Y.; no. 50952, 1 specimen from New Jersey; nos. 20726, 25566, 38277, and 39651, 4 specimens from Rhode Island; nos. 5962, 12690, 21486, 26576, 26598, 26607, 30695, 30858, 31922, 38728, 39869, 44649, 47345, 57285, 68555, 80013, 80014, 83797, and 125691, consisting of a large series of specimens from Florida; no. 127479, 3 small specimens from Alabama; nos. 710, 46291, 73575, 118601 to 118603, and 120074, a small series from Texas; nos. 80036, 80057, 80061, and 80062, a small series from Panama; nos. 4733, 9784, 12556, 82409 to 82413, and 82414, a small series from Cuba; nos. 63053, 73832, 8 specimens from Puerto Rico; nos. 30039 and 30040, 2 specimens from Jamaica; no. 94762, 2 specimens from Puerto Colombia, Colombia; nos. 123076 to 123078, 5 specimens from the Gulf of Venezuela; no. 83434, a specimen, locality uncertain, but probably from Rio de Janeiro.

This Atlantic subspecies has a known range from Woods Hole, Mass., to Florida, the West Indies, the Gulf of Mexico, and Central America southward to Montevideo, Uruguay.

Oligoplites saurus inornatus Gill

Oligoplites inornatus Gill, Proc. Acad. Nat. Sci. Philadelphia, 1863: 166 (U.S.N.M. no. 30959 from west coast of Panama).—Jordan, Evermann, and Clark, Rept. U. S. Comm. Fish. 1928, pt. 2: 277. 1930 (Panama).

Chorinemus inornatus Günther, Trans. Zool. Soc. London 6, pt. 7: 433. 1868 (Pacific coast of Central America).

Chorinemus occidentalis Boulenger, Bol. Mus. Zool. Anat. Comp. Univ. Torino 14(335): 7. 1899 (Bay of Sta. Elena, Ecuador).

Oligoplites saurus Jordan and Gilbert, Proc. U. S. Nat. Mus. 5: 625. 1883 (Panama).—Jordan, Proc. U. S. Nat. Mus. 8: 375. 1885 (Mazatlán; Panama).—(in part) Jordan and Evermann, U. S. Nat. Mus. Bull. 47: 898. 1896 (Tropical America to Baja California).—(in part) Gilbert and Starks, Mem. California Acad. Sci. 4: 70. 1904 (Panama Bay; Mazatlán, Mexico).—Hildebrand, Bull. U. S. Bur. Fish. 41: 285. 1925 (El Salvador).—(in part) Meek and Hildebrand, The marine fishes of Panama) pt. 2: 390, pl. 39, fig. 1, 1925 (Panama).—(in part) Jordan, Evermann, and Clark, Rept. U. S. Comm. Fish. 1928, pt. 2: 277. 1930 (Central America to Lower California).—Breder, Bull. Bingham Oceanogr. Coll., 1(3): 17. 1936 (Conception Bay, Baja California).

Oligoplites occidentalis Jordan and Gilbert, Proc. U. S. Nat. Mus. 5: 374. 1882 (U.S.N.M. no. 30959, type of *O. inornatus*); Bull. U. S. Fish Comm. 1882, 2: 110. 1882 (Panama).

This species is scarcely distinct from *saurus* of the Western Atlantic, and I separate them subspecifically on the doubtful bases of a little higher average number of gill rakers in the specimens from the Pacific, along with an extra "middle" row of minute villiform teeth on the premaxillary, scarcely developed in *saurus* of the Atlantic.

The following specimens, all in the U. S. National Museum, were examined: no. 131403, off southern California; nos. 41258 and 54571, 9 specimens from Guaymas, Mexico; nos. 28359 and 29208, 4 specimens from Mazatlán, Mexico; no. 87339, 1 specimen from El Salvador; nos. 50450, 79939, 79963, 79966, 80030, 80048, 80056, 80058 to 80060, 81993, and 123082, numerous specimens from Panama.

This Pacific subspecies ranges from southern California southward to Panama and the Bay of Sta. Elena, Ecuador.

Oligoplites altus (Günther)

Chorinemus altus Günther, Trans. Zool. Soc. London 6: 433, fig. 1868 (west coast of Panama).—

? Boulenger, Bol. Mus. Zool. Anat. Comp. Univ. Torino 14(335): 7. 1899 (Guayaquil).

Oligoplites altus (in part) Jordan and Evermann, U. S. Nat. Mus. Bull. 47: 899. 1896 (Panama). —Gilbert and Starks, Mem. California Acad. Sci. 4: 72, pl. 11, fig. 20. 1904 (Panama market).—Meek and Hildebrand, The marine fishes of Panama 2: 388, pl. 38, fig. 1. 1925 (Panama).—Jordan, Evermann, and Clark, Rept. U. S. Comm. Fish. 1928, pt. 2: 278. 1930 (Panama).

Two specimens from Panama, U.S.N.M. nos. 80063 and 82043, form the basis on which this study was made.

This Pacific species has been reported from Panama and from Guayaquil, Ecuador.

Oligoplites mundus Jordan and Starks

Oligoplites mundus Jordan and Starks, *in* Jordan and Evermann, Rept. U. S. Fish Comm. 21: 344. 1896 (Mazatlán) (name only); U. S. Nat. Mus. Bull. 47: 2844. 1898 (San Juan and Algodones Lagoons, Mexico).—Gilbert and Starks, Mem. California Acad. Sci. 4: 72, pl. 12, fig. 21. 1904 (Panama; Algodones Lagoon and Mazatlán, Mexico).—Starks, Proc. U. S. Nat. Mus. 30: 784. 1906 (Guayaquil).—Meek and Hildebrand, The marine fishes of Panama, pt. 2: pl. 38, fig. 2. 1925 (Gulf of California to Ecuador).—Hildebrand, Bull. U. S. Bur. Fish. 41: 285. 1925 (El Salvador).—Jordan, Evermann, and Clark, Rept. U. S. Comm. Fish. 1928, pt. 2: 278. 1930 (Mazatlán).—Tortonese, Bol. Mus. Zool. Anat. Comp. Univ. Torino 47: 162. 1939 (Callao).

Chorinemus saliens ? Boulenger, Bol. Mus. Zool. Anat. Comp. Univ. Torino 14(335): 7. 1899 (Bay of Sta. Elena).—? Steindachner, Denkschr. Akad. Wiss. Wien 72: 126. 1902 (Guayaquil).

Oligoplites altus Jordan and Gilbert, Bull. U. S. Fish Comm., 1882, 2: 106, 110. 1882 (Mazatlán and Panama); Proc. U. S. Nat. Mus. 5: 374. 1882 (on U.S.N.M. no. 30969 from Panama).—Jordan, Proc. U. S. Nat. Mus. 8: 375. 1885 (Panama).—Jordan and Evermann, U. S. Nat. Mus. Bull. 47, pt. 1: 899. 1896 (Panama).

The following specimens were studied: U.S.N.M. nos. 28183, 28354, 28274, 29558, 41257, and 46496, a small series from Mazatlán and the west coast of Mexico; U.S.N.M. no. 87338, a specimen from El Salvador; U.S.N.M. nos. 30738, 30969, 76795, 79936, 79938, 79960, 80027, 80028, and 80051 to 80055, a large series of specimens from Panama; U.S.N.M. nos. 53483 and 88698, 5 specimens from Ecuador.

The entire account by Jordan and Evermann on page 899 in U. S. Nat. Mus. Bull. 47 for *O. altus* appears to have been based on specimens of *mundus*.

This Pacific species ranges from the Gulf of California to Callao, Peru.